

Patient Satisfaction with Cardiac Rehabilitation

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## Abstract

**Background:** Cardiac Rehabilitation (CR) societies recommend assessment of patient satisfaction given its association with healthcare utilization and outcomes. Recently, the Patient Assessment of Chronic Illness Care (PACIC, Glasgow) was recommended as an appropriate tool for the CR setting. The objectives of this study were to: (1) describe patient satisfaction with CR, (2) test the psychometric properties of the PACIC in the CR setting; and (3) assess the association of patient satisfaction with CR utilization and outcomes.

**Methods:** Secondary analysis was conducted on an observational, prospective CR program evaluation cohort. A convenience sample of patients from one of 3 CR programs was approached at their first CR visit, and consenting participants completed a survey. Clinical data were extracted from charts pre and post-program. Participants were emailed surveys again 6 months (included the PACIC), 1 and 2 years later.

**Results:** Of 411 consenting patients, 247 (60.2%) completed CR. The mean PACIC score was  $2.8 \pm 1.1/5$ . Internal reliability was  $\alpha = .95$ . The total PACIC score varied significantly by site ( $F = 3.12$ ,  $p = .046$ ), indicating discriminant validity. Patient satisfaction was significantly related to greater CR adherence ( $r = .22$ ,  $p < .01$ ) and completion ( $t = 2.63$ ,  $p < .01$ ), greater functional status at CR discharge ( $r = .17$ ,  $p = .03$ ) and 2 years post-intake ( $r = .19$ ,  $p = .03$ ), greater physical activity at discharge ( $r = .18$ ,  $p = .02$ ), as well as lower depressive symptoms at discharge ( $r = -.16$ ,  $p = .02$ ) and 1 year follow-up ( $r = -.19$ ,  $p = .03$ ). These associations sustained adjustment for sex.

**Conclusions:** Patients were relatively satisfied with their care. The PACIC is a psychometrically-validated scale which could serve as a useful tool to assess patient satisfaction with CR.

## **Dedication**

I would like to dedicate this to my friends, family and mentors, without their support and encouragement I would not have come this far.

## **Acknowledgments**

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# INTRODUCTION

Patient satisfaction is considered to be a hallmark indicator of healthcare quality <sup>1</sup>. It refers to a patient's personal evaluation of healthcare received as well as of the provider <sup>2</sup>. Patient satisfaction is conceived as multidimensional, comprised of elements such as interpersonal manner, technical quality, accessibility/ convenience, finances, efficacy/outcomes, continuity, physical environment and availability <sup>2</sup>. Patient satisfaction does not often correspond with objective reality, or the perceptions held by providers or administrators regarding care <sup>3</sup>. Patient satisfaction has been shown to be associated with a greater adherence to medical advice, healthcare utilization and health outcomes <sup>4</sup>, although mixed evidence is reported <sup>5</sup>.

Cardiac rehabilitation (CR) is an outpatient chronic disease management model recommended in clinical practice guidelines for patients with all forms of atherosclerotic cardiovascular diseases <sup>6</sup>. In general, patients attend CR twice per week over 4 to 6 months <sup>7</sup>, during which time they receive the well-established core components of the model, namely risk factor assessment, structured exercise training, patient education, as well as dietary and psychosocial counseling<sup>8</sup>. CR participation is associated with 20% lower cardiovascular mortality <sup>9</sup>, with greater participation associated with greater benefits <sup>10</sup>. Given the number of visits involved in CR, patient satisfaction may be key to CR adherence and subsequent health outcomes, including satisfaction with each of the core components.

Given the association between patient satisfaction and preventive healthcare utilization <sup>11,12,13</sup>, and the importance of establishing the quality of CR services provided, several national CR associations recommend that patient satisfaction be assessed routinely<sup>14,15</sup>. Despite these recommendations, there is little available evidence regarding patient satisfaction with CR. A

recent review identified only 8 studies in the area <sup>16</sup>. The scant published data suggest patients have high satisfaction, in particular with staff and the motivating environment, information received regarding their disease, information on diagnosis and treatment as well as counselling regarding medication management <sup>17,18</sup>. Moreover, the existing studies have important limitations, including the use of non-validated questionnaires and lack of non-CR comparison groups. This thesis thus fills a gap in the field by robustly ascertaining patient satisfaction with CR.

## **LITERATURE REVIEW**

In this section, studies which have examined patient satisfaction in a CR setting were carefully reviewed, in chronological order. Following a rapid review several years ago, eight studies or abstracts were identified <sup>16</sup>. An updated literature search revealed no subsequent publications. Furthermore, the scales or methods used to measure satisfaction in these studies were also considered. This will be followed by an introduction to the recommended assessment tool for patient satisfaction in the CR setting, and it's associated theoretical basis.

Before considering the CR-specific studies, an overview of what is known about satisfaction in patients more broadly is provided. It is generally accepted that patient satisfaction is associated with greater adherence to treatment recommendations <sup>5,19</sup>, healthcare utilization and with improved health outcomes. However, there are some caveats to consider. Patients are not trained in medicine, and therefore ratings should not be considered indicative of the technical quality of care<sup>5</sup>. Moreover, it has been found that patient satisfaction is highly influenced by factors unrelated to care, and so the ratings are questionable <sup>5</sup>. However, overall satisfaction with care has been shown to be positively correlated with clinical adherence to treatment guidelines,

although this finding has not been consistent throughout the literature on patient satisfaction<sup>5,19</sup>. Furthermore patient satisfaction has been found to also capture patient evaluation of communication with nurses and physicians (but not non-care aspects such as meals and room features)<sup>20, 21</sup>. Moreover, one would not expect patients to be satisfied with their care when for example a physician is communicating to a patient about the need to engage in more exercise or about their mental health; physicians often need to have difficult conversations with patients. Finally, patients may request inappropriate tests or treatments or over-treatment, which is subsequently denied by the provider, resulting in high-quality care but low patient satisfaction. These factors should be taken into consideration when pondering satisfaction with CR and how to increase it. Clearly efforts to increase patient satisfaction should not focus on these confounding factors, but instead on care elements such as coordination and patient engagement that are associated with both satisfaction and outcomes.

### **Studies on Patient Satisfaction with CR**

In a prospective cohort study, 239 coronary artery bypass graft surgery (CABG) patients whom attended CR were compared to 452 CABG patients who did not attend CR at 6 months and 12-month post-surgery<sup>22</sup>. The Seattle Angina Questionnaire (SAQ) was used to assess patient satisfaction. The questionnaire is composed of five subscales, one of which is the treatment satisfaction subscale containing four items. Questions assess patients' overall satisfaction with health care received with response options ranging from 1 (not at all satisfied) to 5 (highly satisfied) with higher scores indicating greater treatment satisfaction. For example, patients are asked to report how satisfied they are with their "current treatment of chest pain or angina". Results of the study indicated CR participants reported similar treatment satisfaction as non-participants at 12-month post-surgery.

A qualitative study using focus groups assessed satisfaction among 16 patients who attended a hospital-based CR program and ten patients who participated in a home-based program using the Heart Manual <sup>23</sup>. The topics covered in the focus groups included views on the different components of their program (e.g. education regarding diet and medication use). Results indicated all patients reported that they had enjoyed CR, in particular, feeling an improvement in their health and confidence to return to activities they enjoyed. They appreciated learning about lifestyle changes and medication. Furthermore, hospital-based program participants liked exercising in a group setting, as they gained motivation and support from the others, whereas home program patients reported satisfaction with the Heart Manual and valued the one-on-one support given by the nurse facilitators.

In a cross-sectional study, 65 CR participants with either CABG or myocardial infarction (MI) were asked to rate CR program features using the newly-developed Cardiac Rehabilitation Preference Form <sup>24</sup>. Seventeen items were selected based on a review of the literature and insight gained from focus groups with CR participants. Patients were asked to indicate the importance and the extent to which they experienced 17 features of CR programs (e.g., received individualized attention, see progress, acceptable cost and flexible hours), with response options ranging from 0 (strongly disagree) to 4 (strongly agree). Participants indicated that “discussing progress” and “encouragement from professionals” were the most important CR features. The preferences that were well-met for all participants were transportation, drive time, exercises easily learned, no interference with other activities, cost, not being bored while exercising, encouragement provided from professionals, and parking convenience. “Obtaining transportation” was rated as the least important feature among participants.

In a prospective study, satisfaction was assessed among patients in a registry from 14 centers that perform CABG surgery in Israel. There were 2,085 patients between 45 and 66 years of age who survived for one year and participated in CR who were included in the study<sup>25</sup>. Of these, 124 patients who participated in CR were matched on age and sex to controls (n=246). The satisfaction assessment tool used was an investigator-generated item on satisfaction with medical services since the CABG operation (i.e., satisfaction with health care since operation, self-perception of overall health, self-perception of general functioning) with response options ranging from 0 (dissatisfied/bad) to 5 (very satisfied/excellent). Results indicated patients who participated in CR reported significantly higher satisfaction with medical care than the matched controls who did not participate.

A randomized controlled trial consisting of 105 participants diagnosed with either glucose intolerance or type 2 diabetes, aimed to investigate patients' satisfaction with CR<sup>18</sup>. Patients were randomly assigned to either CR or usual care. A standardized interview questionnaire covering overall satisfaction and level of information with closed-answer response options was administered. Patients receiving CR reported a high level of overall satisfaction with follow-up treatment, compared with patients receiving usual care. The CR group reported a higher level of satisfaction with regard to information about their disease, information on diagnosis and treatment, self-management of lifestyle changes, and counselling regarding medication management.

In a prospective observational study, 68 CR participants with coronary artery disease who underwent angiography for angina were compared to 153 CR non-participants<sup>26</sup>. There were no significant differences in satisfaction between groups six months following angiography, or

improvements from the time of angiography between those who went to CR and those who did not complete the entire program.

A prospective study investigated 2371 patients with either acute coronary syndrome, or who were post-revascularization or valve procedure who were enrolled in CR <sup>27</sup>. The satisfaction assessment tool used was an investigator-generated item which examined to what extent a patient's expectations were satisfied with the CR program. At CR conclusion, participants were asked to what extent their expectations were met, with response options ranging from 0%-100%. Results indicated that satisfaction was greater than 80% in the majority of patients (no other detail provided).

Finally, in a cross-sectional study, 4371 patients with ischemic heart disease who received at least some CR were followed <sup>28</sup>. An investigator-generated satisfaction tool was administered, where CR participants were asked about the degree to which they agree with three statements (i.e., fully agree, partially agree or disagree; e.g., "my rehabilitation has been well planned"). Participants who partially or fully-agreed with all statements were considered "satisfied". Results indicated 52.5% of CR participants were satisfied and 10% were dissatisfied.

In summary, there have been only eight studies on patient satisfaction in the CR setting. With regard to assessment tools, three (37%) studies administered investigator-generated items (i.e., non-validated), two (25%) used interview questions with closed-answer response options and three (38%) used psychometrically validated scales. Moreover, six studies administered CR-specific items. In terms of location, only two have been conducted within North America, whereas the others have taken place in Denmark, Switzerland, Australia and Israel and the United Kingdom. No studies have been conducted in Canada. Overall, patients reported varying levels of satisfaction with CR, but generally seem moderately satisfied.

## Measurement of Patient Satisfaction in the CR Setting

Assessment of patient satisfaction requires the proper tools and methods. This is particularly important because inflated satisfaction ratings often result where non-validated items are administered<sup>29, 30,31</sup>. To date, only two validated scales have been administered in CR samples, namely the Seattle Angina Questionnaire treatment satisfaction subscale<sup>32</sup> and CR Preference Form<sup>33</sup>.

The Seattle Angina Questionnaire is a validated measure, which has a 4-item treatment satisfaction subscale<sup>32</sup>. Thus far this measure is the only generic satisfaction scale that has been administered in a CR setting. However, in these studies, the primary objective was not to assess patient satisfaction, but quality of life (which is what the questionnaire is purported to measure). The two studies which administered the Seattle Angina Questionnaire found no differences in satisfaction between CR participants and non-participants<sup>26,22</sup>. Therefore, this suggests it is not a sensitive measure for the CR setting.

In addition to the Seattle Angina Questionnaire, the Cardiac Rehabilitation Preference Form has also been administered in a CR setting<sup>33</sup>. Rather than a generic (i.e., also applicable to patients not attending CR) measure, the Cardiac Rehabilitation Preference Form is a CR-specific measure in which participants are to rate the importance of a specific CR feature on a 3 point Likert-type scale. The importance scale ranges from one being of ‘very little importance’ to 3 being ‘highly important’. Participants are to rate various features of CR such as “set own goals”, “discuss progress”, and “not get overly tired”. Administering this scale has the potential to give much more detailed information regarding what patients specifically like about a CR program compared to a much more general and overall rating of health care received. It could be administered to patients in different CR programs and comparisons in patient satisfaction

between programs could be made. However, only generic measures can be administered to CR participants and non-participants alike, and hence establish whether patients exposed to CR are more satisfied with their care than those who are not.

As outlined above, psychometrically-validated tools appropriate to measure patient satisfaction in CR have not been established, however the recent review in the area <sup>16</sup> recommended the Patient Assessment of Chronic Illness Care (PACIC) <sup>34</sup> may be appropriate. This generic tool assesses multiple dimensions of patient satisfaction, in accordance with Wagner's Chronic Care Model. The Chronic Care Model is an established framework, comprised of essential components of health care systems that inspire high-quality chronic care. The PACIC has yet to be administered in the CR setting, and hence its psychometric performance in this context is not yet known.

## **Objectives**

The objectives of this thesis were to: (1) describe, for the first time, patient satisfaction with CR using the recommended psychometrically-validated scale, namely the PACIC; (2) psychometrically-test the PACIC in a CR setting as an indicator of CR satisfaction by assessing its': (a) internal reliability; (b) discriminant validity (i.e., whether the PACIC can capture variation in satisfaction across CR sites), and (c) construct validity (i.e., association with resources available to manage chronic illness); and (3) assess the association of patient satisfaction with CR with program utilization and outcomes. Greater patient satisfaction was hypothesized to be associated with CR use (i.e. shorter wait time, greater adherence, and completion), greater functional status, heart-health behavior (i.e., exercise, diet, medication adherence, and smoking), and psychological well-being (i.e. depressive symptoms).



# **METHODS**

## **Design**

This study was observational, and prospective in design. Approval was received from the research ethics review boards at the institutions of each participating CR site (University Health Network Research Ethics Board, and Research Ethics Board of Southlake Regional Health Centre [also board of record for Mackenzie Health]). Patients initiating CR at one of 4 centers were approached to participate between July 2010 and February 2014. Participants were asked to complete surveys at CR initiation and completion (or the expected time of graduation for those who did not complete), as well as 1 and 2 years from CR initiation. Clinical data were extracted from participants' medical charts for their CR intake and discharge assessments (where available).

## **Setting**

The cohort consisted of participants from 3 CR sites in the Greater Toronto Area, Canada and one satellite program (associated with site 1). The attributes of each site are described elsewhere<sup>35</sup>. In brief, 3 of the programs were offered at no charge to participants, while the third had a minimal charge for patients who had private health insurance coverage or can afford it. Two of the CR programs were located adjacent to a community hospital within a suburban setting, while the other was located within an academic hospital in an urban setting; its' satellite program was on a university campus.

All programs offered CR in accordance with the Canadian Association of Cardiovascular Prevention and Rehabilitation (CACPR) Guidelines<sup>8</sup>. Program frequency and duration varied by site: the program which was located in an academic hospital offered 90 minute classes twice per

week, for a duration of 4 months. One community CR program offered 60-90 minute classes twice per week, and the other community and satellite programs offered one 90-minute class per week, each for 6 months. All programs offered patient education, on-site exercise programs, dietary counselling for groups or individuals, smoking cessation referrals, and psychosocial assessment/support.

## **Procedure**

At their first CR visit, patients were approached to solicit written, informed consent by administrative staff at the site. Participants were asked to complete a self-administered survey in paper or online format. The survey assessed sociodemographic characteristics, heart-health behaviours (i.e., exercise, nutrition, medication adherence), functional capacity, and depressive symptoms. Participants enrolling in the CR program completed an intake assessment as part of their standard care. This included risk factor assessment, an exercise stress test, and blood work (e.g. lipid panel, glycated hemoglobin or HbA1c). Data were extracted from charts.

The clinical assessment was repeated at the end of CR for those who completed the program. Available data were extracted from participants' CR charts, including program utilization. A second survey was provided to all study participants centrally (regardless of CR program use), via mail and/or online. It assessed the same elements as noted above, but also included wait times, and the PACIC patient satisfaction measure<sup>34</sup>. To optimize the response rate, at each assessment point, non-responders were sent a repeat e-mail, and then they if they still had not responded they were contacted by telephone.

A survey was also administered centrally to all study participants at 1 and 2 years' post-intake, via mail and/or online. Heart-health behaviours, functional capacity and depressive

symptoms were again assessed. The Chronic Illness Resource Survey<sup>36</sup> was also administered in the 2-year survey.

## **Participants**

This convenience sample consisted of all consenting participants attending an initial visit at 1 of the 4 CR programs. Participants were referred to the CR programs with the following cardiac diagnoses or procedures: acute coronary syndrome, chronic stable angina, or stable heart failure, as well as percutaneous coronary or valvular intervention, coronary artery bypass graft (CABG) ± valve surgery, cardiac transplantation, or mild non-disabling stroke.<sup>8</sup> The inclusion criterion was that participants were not deemed ineligible to complete CR upon initial assessment (i.e. no co-morbidities identified or indications from the exercise stress test that would preclude CR participation). Participants who were not proficient in the English language were excluded from the study.

## **Measures**

Sociodemographic characteristics such as participants' ethnic origin (adapted from Statistics Canada categorizations), marital status, highest educational attainment and work status, were assessed via self-report. Clinical data was extracted from CR referral forms, as well as CR intake and discharge assessments, where available. The following variables were collected: previous cardiac diagnoses, CR referral indications, cardiac risk factors (i.e., blood pressure, lipids, blood glucose, and anthropometrics), and functional capacity which was obtained from the graded exercise stress tests (i.e., peak Metabolic Equivalent of Task [METs]).

## **Dependent Variable: Patient Satisfaction**

Patient satisfaction was measured using the PACIC ([http://www.improvingchroniccare.org/index.php?p=PACIC\\_survey&s=36](http://www.improvingchroniccare.org/index.php?p=PACIC_survey&s=36))<sup>34</sup>. It is a 20-item scale, consisting of 5 subscales which correspond to the elements of Wagner's Chronic Care Model,<sup>37</sup> namely: (1) patient activation, (2) delivery system / practice design, (3) goal-setting/ tailoring, (4) problem-solving / contextual, and (5) follow-up / coordination.<sup>34</sup> Respondents were asked to indicate how often they experienced the content described in each item (e.g., asked for ideas when making a treatment plan) on a 5-point Likert scale from 1 (*none of the time*) to 5 (*always*). The subscales were scored by averaging responses to subscale items; the overall PACIC score is calculated by averaging scores across all 20 items. Higher scores denote greater satisfaction. In the initial validation, the internal reliability of the PACIC was  $\alpha=0.93$ , indicating excellent reliability<sup>34</sup>. The construct validity of the PACIC is supported by a significant, positive association with patient activation<sup>38</sup>.

The Chronic Illness Resource Survey<sup>36</sup> was administered to compare with the PACIC, to get a sense of construct validity. This scale measures support and resources in 7 areas: doctor and health care team, family and friends, personal, neighborhood / community, media / policy, organization and work. Participants were asked to rate the degree to which each resource / item was used over the past 6 months, on a Likert scale from 1 (*not at all*) to 5 (*a great deal*). Items are averaged, with higher scores indicating greater resources in a given domain.

## **Independent Variables**

CR utilization was operationalized as program adherence (i.e., ratio of sessions completed to those prescribed) and completion (i.e., patient must have attended at least some of the CR intervention components and have had a formal re-assessment by the CR team at the

conclusion of the CR intervention).<sup>39</sup> Patients were also asked to report the number of weeks that passed between hospital discharge and CR initiation (i.e., wait time).

The Duke Activity Status Index<sup>40</sup> is a 12-item self-report scale, where patients are asked whether they can complete a list of activities of daily living. Each activity they can complete is weighted in terms of METs, and these are summed. Higher scores denote greater functional capacity. This scale correlates highly with peak oxygen uptake on cardiopulmonary assessments.

The Patient Health Questionnaire-8<sup>41</sup> is a reliable and validated depressive symptom screening scale, through which respondents are asked to report the frequency of depressed mood in the last 2 weeks. Each item is scored on a Likert-type scale from 0 (*not at all*) to 3 (*nearly every day*). A total score was computed by summing responses, with higher scores indicating more severe depressive symptoms. A score of  $\geq 10$  was used to denote elevated depressive symptoms.

### *Heart-Health Behaviors*

Participants were asked to self-report their smoking status. Next, the Godin Leisure-Time Exercise Questionnaire<sup>42</sup> is a brief and reliable instrument to assess usual physical activity during a typical 1-week period. Frequencies of strenuous, moderate, and light-intensity activities were assessed. Higher scores indicate a greater amount of exercise. Those scoring above 24 are believed to be physically active and those scoring below are considered insufficiently active.

The Health Promoting Lifestyle Profile II<sup>43</sup> nutrition subscale contains 6 statements that assess daily personal nutrition habits. Response options range from 1 (*never*) to 4 (*routinely*), indicating the frequency with which a particular nutrition behavior is practiced. A mean value was computed, with higher scores representing a healthier diet.

Finally, the 4-item version of Morisky's Medication Adherence Scale<sup>44</sup> was also administered. Response options are "yes" I agree with the statement (scored as 0) or "no" I do not (scored as 1). Responses are summed, and a total score of < 4 indicates "non-adherence".

## **Statistical Analysis**

SPSS software version 23 (IBM, Armonk, NY) was used for statistical analysis. A significance cut-off value of  $p < .05$  was applied throughout. Descriptive statistics were computed to describe the sociodemographic and clinical characteristics of the sample by retention status. Chi-square or t-tests were used as appropriate.

Descriptive examination of patient satisfaction, and its internal reliability was computed (Cronbach's alpha). Values higher than .60 are generally considered acceptable<sup>45</sup>. Total patient satisfaction and subscales scores were compared by site using analysis of variance (ANOVA), with post-hoc Tukey tests. Finally, Pearson's correlations were computed between the PACIC and the Chronic Illness Resource Survey.

To test the final objective, Pearson's correlations were computed between the PACIC total score and the continuous independent variables. Student's t-test or F-tests were performed to test the association between the PACIC and any categorical independent variables (e.g., CR completion). Given these associations may be impacted by differences in patient satisfaction by sociodemographic or other characteristics<sup>46</sup>, t-tests and correlations were run as applicable to ascertain whether patient satisfaction did vary by sex, age, ethnicity, and indication for CR (e.g., CABG). Where significant, general linear models were constructed for the significant independent variables above, adjusting for the given characteristic<sup>47</sup>.

## RESULTS

### Respondent Characteristics

Figure 1 displays the flow of participants through the study. As shown, 60% completed CR discharge assessments and thus were considered to have completed CR. Characteristics of participants retained at CR discharge versus those lost to follow-up are reported elsewhere<sup>35</sup>. In summary, participants who completed CR were significantly less likely to have been referred due to arrhythmia, and more likely to have been prescribed acetylsalicylic acid at hospital discharge. No other differences were observed (data not shown). One hundred and seventy-two (58.5%) participants graduated from CR and had also completed the discharge survey. Where provided, participants whom did not attend CR reported cost and distance to CR as reasons for not completing the program.

As shown in Figure 1, less than half of participants completed the 2-year follow-up survey. Table 1 displays the pre-CR characteristics of participants retained 2 years later versus those lost to follow-up. With regard to sociodemographic characteristics, as shown, retained participants were more likely to self-report “North American” ethnocultural background versus any other origin (e.g., European, Asian) compared to those lost to follow-up. No other differences were observed.

Mean scores for the factors hypothesized to relate to patient satisfaction are displayed in Table 2, for each assessment point. Based on Godin scores  $>24$ <sup>42</sup> suggesting participants were meeting exercise guidelines of 150 minutes/week<sup>48</sup>, 154 (52.9%) participants were considered physically active at intake, 108 (62.1%) at the assessment point corresponding to CR discharge (some patients did not complete CR), 104 (64.6%) at 1 year, and 87 (56.9%) at 2 years from intake. With regard to depressive symptoms, 43 (9.3%) participants had symptom scores

suggestive of major depression at intake, 18 (3.9%) post-program, 24 (5.2%) at 1 year, and 28 (6.0%) at 2 years from intake.

## **Patient Satisfaction**

Mean patient satisfaction scores are shown in Table 3. Satisfaction was greatest for the Delivery system / Practice design subscale (i.e., actions that organize care and provide information to patients to enhance their understanding of care) and lowest for the follow-up / coordination subscale (i.e., making proactive contact with patients to assess progress and coordinate care). Internal reliability is also reported, and should be considered excellent for the total scale and subscales.

With regard to objective 2, PACIC total and subscale scores were compared by site (Figure 2). The total PACIC score varied significantly by site ( $F=3.12$   $p=.046$ ), indicating discriminant validity. As shown, Post-hoc tests revealed patients reported significantly more satisfaction at sites 1 and 2 compared to site 3. There were significant site differences in 4 of the 5 subscales as well, namely Patient Activation ( $p=.005$ ), Delivery system / Practice design ( $p=.02$ ), Goal Setting ( $p=.02$ ) and Problem Solving ( $p=.03$ ). Post-hoc tests again revealed patients reported significantly more satisfaction in each of these domains at sites 1 and 2 compared to site 3. As shown in Table 4, greater total patient satisfaction was significantly related to greater overall resources to manage their chronic illness, as well as specific domains such as medical, family, personal, community and organizational resources, suggesting construct validity.

With regard to objective 3, as shown in Table 2, greater total patient satisfaction was significantly related to greater CR adherence and completion, greater functional status at CR discharge and 2 years post-intake, greater physical activity at discharge, as well as lower



depressive symptoms at discharge and 1 year follow-up. There was a trend towards better diet at 2 years, but no other associations were observed.

With regard to CR completion more specifically, those who completed had a total PACIC score of  $2.94 \pm 1.10$  versus  $2.48 \pm 1.17$  for those who did not complete CR ( $p=.009$ ). The association of CR completion with PACIC subscales is shown in Table 3. Patients who completed CR had significantly greater satisfaction in all areas except follow-up/coordination compared to patients who did not complete CR.

Given these associations may be confounded, the association of the PACIC to sociodemographic and clinical characteristics was assessed, to determine whether these should be taken into consideration in analyses. Total PACIC scores were not related to age ( $p=.56$ ), ethnic background ( $p=.31$ ), nor having CABG as an indication for CR ( $p=.27$ ). However, PACIC scores did differ significantly by sex ( $t=-2.10$ ,  $p=.04$ ), with women ( $3.02 \pm 1.12$ ) reporting significantly greater satisfaction than men ( $2.66 \pm 1.14$ ). Therefore, the association between the significant independent variables as summarized above and PACIC scores were each tested with adjustment for sex. As shown in Table 2, all models were significant overall, and the independent variables themselves remained significantly associated with patient satisfaction.

## **DISCUSSION**

This is the first study to our knowledge to have investigated patient satisfaction using the recommended generic and psychometrically-validated measure in the CR setting<sup>16</sup>. Results suggest the PACIC<sup>34</sup> is a reliable, valid and sensitive measure of satisfaction for the CR setting. Patients were relatively satisfied with their chronic cardiac care, with those completing CR reporting greater satisfaction than those not completing.

The average PACIC score in this cohort was moderate (i.e., 2.8/5, but closer to 3 in those completing CR). The PACIC has been administered in several other cohorts in Canada. For instance, mean overall satisfaction scores were somewhat lower among patients with diabetes, heart failure, arthritis and chronic obstructive pulmonary disease from 33 primary care clinics (2.54) than observed in the present study, although satisfaction did vary based on the practice model<sup>49</sup>. In another study of patients with hypertension, diabetes and chronic obstructive pulmonary disease from 9 academic family practices, satisfaction scores were very comparable to those in the present study at 2.8<sup>50</sup>.

The PACIC has also been administered in cardiac samples, but none in Canada to our knowledge. Comparable scores were again observed. For example, the PACIC was administered to patients with cardiovascular diseases, chronic obstructive pulmonary disease, heart failure, and stroke in the Netherlands, and the mean score was 2.9<sup>51</sup>. Two cohorts of patients with type 2 diabetes, ischaemic heart disease and/or hypertension receiving care in Australian general practices were administered the PACIC questionnaire. Mean scores were somewhat higher at 3.0 and 3.1<sup>52</sup>. Finally, the PACIC was also administered in a sample of patients with diabetes, chronic pain, heart failure, asthma, or coronary artery disease across a major Health Maintenance Organization in the United States. The mean score (2.7) was quite similar to that reported in this cohort, indicating moderate levels of satisfaction<sup>53</sup>. In summary, mean patient satisfaction ratings among cardiac patients in this sample were comparable to other chronic disease patients in the same health care system, and to cardiac patients in other types of health care systems, with most ratings suggesting moderate satisfaction with care.

Greater patient satisfaction, as assessed via the PACIC, was associated with greater CR utilization, functional capacity, exercise and fewer depressive symptoms. It was not associated

with some other outcomes as hypothesized; however, it may not be realistic to expect that patient satisfaction with CR would be related to health behaviors over a year post-program. None of the previous studies on patient satisfaction with CR have explored the association of satisfaction with these outcomes. Clearly more research is needed to understand whether high patient satisfaction is associated with greater recommendation adherence and better outcomes, and this must be tested in a rigorous, prospective fashion. Moreover, it should be tested whether improving elements of a CR program with which patients are unsatisfied will have an impact on their adherence to recommendations and ultimate outcomes.

Patient satisfaction was significantly lower with 1 of the CR programs than the other 2. This was one of the 2 community-based programs (i.e., affiliated with a hospital, but located off-site), and annual patient volumes were in-between that of the other 2 sites; It was also 1 of 2 programs offering 2 formal CR sessions per week. The unique feature of the program is that patients paid a monthly fee to participate, which was reimbursable through private healthcare insurance for patients with such coverage (i.e., through work or purchased privately). Patients may have had higher expectations as a result. Moreover, patients were welcome to continue in the program indefinitely (likely given they were paying; the other 2 programs had set graduation dates). The other potential explanations for lower satisfaction with this CR program could be different culture around patient-provider interactions, or patient dissatisfaction with individual staff members<sup>54</sup>. In future research, co-administration of a CR-specific satisfaction measure and some qualitative, open-ended questions regarding reasons for patient satisfaction would facilitate interpretation of these site differences.

## **Implications & Directions for Future Research**

The PACIC enables comparison of patient satisfaction in patients attending CR versus non-attenders. The incorporation of a comparison group is key to establishing patient satisfaction with CR overall. However, for the purposes of improving CR program delivery, staff should also administer an ancillary measure assessing patient satisfaction with the various components of the program as well. The Cardiac Rehabilitation Preference Form is one such tool, as it measures the extent to which patient preferences for specific CR program components are being met<sup>55</sup>. Where CR administrators understand with which aspects of the program patients are dissatisfied, they could then modify these elements of the program to increase satisfaction, and hopefully ultimately improve CR use, heart-health behaviours and associated outcomes. For example, if patients express dissatisfaction with center hours, they could be modified. If patients express dissatisfaction with the interactions with staff, continuing education could be offered to staff and the program could examine the time that staff have to devote to patient-centered interactions.

## **Limitations**

Caution is warranted when interpreting the findings. First, the representativeness of the cohort is unknown, as the CR sites did not record which CR patients were approached to participate but declined. Consenting patients may have had particular psychological characteristics (such as high motivation and perseverance) that set them apart from patients who did not, and this could have affected the results that were observed. Thus, selection bias may be at play. Second, many of the independent variables were self-reported, which raises the possibility of expectation bias and socially-desirable responding. However, the dependent variable of patient satisfaction is a patient-reported outcome, and hence it is appropriate that this

was self-report and bias is not a concern. Third, due to the rates of 1 and 2 year follow-up survey completion, retention bias is a possibility. However, very few differences in participant characteristics were observed between those retained and those lost to follow-up. Fourth, the design of the study was not randomized, and therefore alternative explanations for patient satisfaction ratings cannot be ruled out, and causal conclusions cannot be drawn. For example, the association between depressive symptoms and patient satisfaction is likely reversed, such that the patients who were more depressed reported lower satisfaction. Fifth, multiple tests of association between patient satisfaction and outcomes were performed, which would increase the potential for Type I error. Finally, the generalizability of the study results to other CR programs is unknown, however 4 centers were considered herein.

This study represented the first examination of CR patient satisfaction using the recommended PACIC tool. This thesis enabled an improved understanding of whether patients accessing CR are more satisfied with their care than those who do not. Ultimately, improved patient satisfaction could lead to greater adherence <sup>4</sup> and better patient outcomes <sup>18</sup>. In addition, this thesis advanced the knowledge regarding the psychometric properties of the PACIC for use in a CR patient sample.

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## **Conclusion**

In conclusion, the PACIC is a psychometrically-validated scale which could indeed serve as a useful tool to assess patient satisfaction in the CR setting. The PACIC is a reliable, valid and also sensitive measure, such that comparison can be made across CR programs. Patient satisfaction with their chronic cardiac care was moderate overall. Greater patient satisfaction was significantly associated with greater CR adherence and completion, greater functional status, and lower depressive symptoms. CR program staff should assess patient satisfaction, in order to better understand degree of their satisfaction, and where lacking, to optimize it to ultimately improve CR use and associated outcomes.

## **Candidate's Role**

The candidate was responsible for the 2-year follow-up survey administration, along with overall study close-out (e.g., source document storage, ethics terminations, knowledge translation to participating sites). Moreover, she conducted the cleaning and analysis of the data. Finally, she drafted the thesis in manuscript format, for submission to a peer-reviewed journal. It has been accepted in *Patient Preference & Adherence*. The candidate has also worked with some other sections of the surveys to generate further manuscripts.

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Figure 1: Participant Flow Diagram

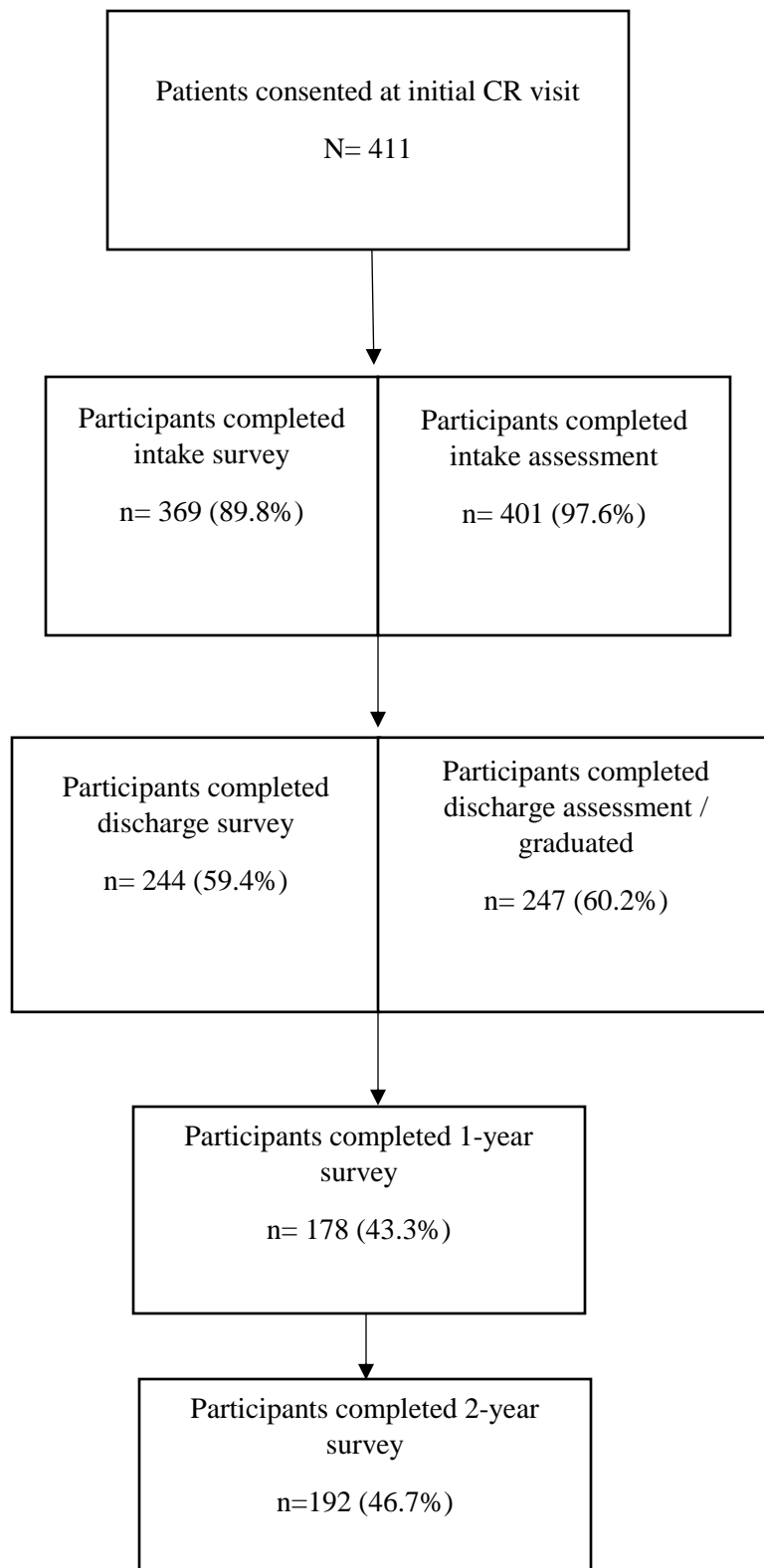
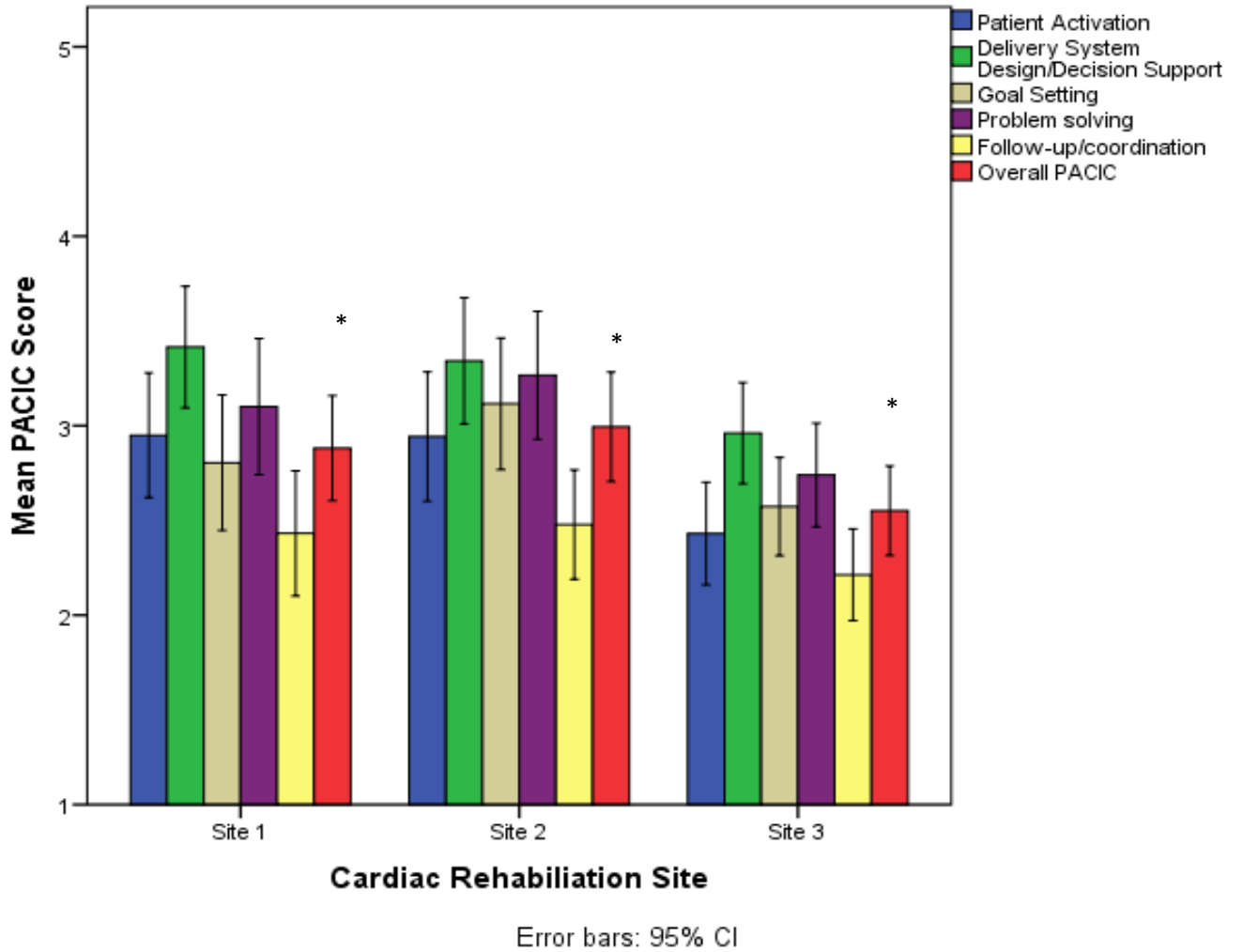


Figure 2: Mean Patient Satisfaction Subscale and Total Scores by Cardiac Rehabilitation Site



\*p<.05

PACIC =Patient Assessment of Chronic Illness Care



Table 1: Sociodemographic and Clinical Characteristics of Participants at Cardiac Rehabilitation intake by 2-year Survey Completion

Characteristics	Retained at 2 years (n= 192, 46.7%)	Lost to follow-up (n=219, 53.3%)	Total (N= 411)
<b>Sociodemographic</b>			
Age† (mean years ± SD)	65.17 ± 9.32	63.82 ± 11.30	64.47 ± 10.42
Sex† (% Male)	138 (71.9)	148 (68.5)	286 (70.1)
Ethnicity (% North American)	74 (46.5)	52 (33.1)	126 (39.9)*
Marital Status (% married)	100 (77.5)	91 (71.7)	191 (74.6)
Education (% completed < college/university)	74 (48.7)	69 (52.3)	143 (50.4)
Work Status (% retired)	74 (47.7)	48 (52.7)	122 (51.5)
<b>Clinical</b>			
Previous cardiac diagnosis (% yes)	7 (41.2)	12 (41.4)	19 (41.3)
Peak METs§ (mean ± SD)	7.26 ± 2.93	7.08 ± 2.95	7.17 ± 2.94
<i>CR Referral Indication†</i>			
PCI	72 (39.3)	81 (40.3)	153 (39.8)
CABG	56 (30.8)	53 (26.4)	109 (28.5)
Other	141 (73.4)	150 (68.5)	291 (70.8)
<i>Risk Factors†</i>			
Dyslipidemia	86 (80.4)	86 (74.8)	172 (77.5)
Hypertension	96 (81.4)	104 (81.3)	200 (81.3)
Obesity	69 (39.9)	85 (44.7)	154 (42.4)
Diabetes	31 (18.8)	46 (24.3)	77 (21.8)
Current Smoker	10 (5.4)	0 (0.0)	10 (5.4)

SD, standard deviation; CABG, Coronary artery bypass grafting; PCI, Percutaneous Coronary Intervention; MET, Metabolic Equivalent of Task.

†source is medical chart (hospital or cardiac rehabilitation program)

§from pre-CR graded exercise stress test.

\*p<.05

Table 2: Independent Variables, and their Association with Patient Satisfaction

Independent variable ( <i>assessment point</i> )	Mean $\pm$ standard deviation or n (%)	Pearson Correlation - unadjusted p	Adjusted <sup>†</sup> Model – overall (p)	Adjusted Model <sup>†</sup> Parameter for independent variable (p)
<i>CR Utilization (discharge)</i>				
Wait time (weeks)	10.71 $\pm$ 6.96	0.12	-	-
Adherence (% prescribed sessions)	65.62 $\pm$ 35.06	<.01	F=4.92 (p<.01)	7.81 (p<.01)
Completion (n, %)	247 (60.2%)	<.01*	F=4.73 (p=.01)	7.37 (p<.01)
<i>Heart-Health Behavior</i>				
Exercise (intake)	29.05 $\pm$ 23.68	0.37	-	-
Exercise (discharge)	31.44 $\pm$ 20.79	0.02	F=2.97 (p=.05)	4.97 (p=.02)
Exercise (1 year)	34.27 $\pm$ 23.71	0.37	-	-
Exercise (2 years)	30.13 $\pm$ 20.57	0.80	-	-
Diet (intake)	2.92 $\pm$ 0.53	0.89	-	-
Diet (discharge)	3.06 $\pm$ 0.51	0.24	-	-
Diet (1 year)	3.00 $\pm$ 0.51	0.54	-	-
Diet (2 year)	2.99 $\pm$ 0.57	0.07	-	-
Medication adherence (intake)	3.38 $\pm$ 1.19	0.94	-	-
Medication adherence (discharge)	3.09 $\pm$ 1.36	0.44	-	-
Medication adherence (1 year)	3.57 $\pm$ .65	0.87	-	-
Medication adherence (2 year)	3.64 $\pm$ .67	0.46	-	-
Smoking Status n, % current (intake)	17 (4.7%)	0.65§	-	-
Smoking Status n, % current (discharge)	11 (4.5%)	0.52§	-	-
Smoking Status n, % current (1 year)	10 (5.7%)	0.87§	-	-
Smoking Status n, % current (2 years)	10 (5.4%)	0.32§	-	-
<i>Functional Status</i>				
Intake	38.43 $\pm$ 14.55	0.77	-	-
Discharge	43.24 $\pm$ 14.72	0.03	F=3.88 (p=.02)	6.58 (p=.01)
1 year	44.00 $\pm$ 14.40	0.64	-	-
2 years	45.80 $\pm$ 14.78	0.03	F=8.61 (p<.01)	8.62 (p<.01)
<i>Depressive Symptoms</i>				
Intake	4.38 $\pm$ 4.97	0.22	-	-
Discharge	3.37 $\pm$ 4.12	0.02	F=4.34	4.23

			(p=.01)	(p=.04)
1 year	4.29 ± 5.23	0.03	F=7.08 (p<.01)	5.24 (p=.02)
2 years	4.21 ± 4.72	0.43	-	-

\*independent samples t-test.

§Analysis of variance

†Adjusted for sex.

The Morisky Medication Adherence Scale is protected by US and international trademark and copyright laws. Permission for use is required. A license agreement is available from: MMAS Research LLC, 14725 NE 20<sup>th</sup> St., Bellevue WA 98007.

CR=cardiac rehabilitation

Table 3: Patient Satisfaction and Subscale Internal Reliability and Mean Scores at CR Discharge, as well as Association with Program Completion

	<u>Cronbach's <math>\alpha</math></u>	<u>Mean Score§</u>	<u>Standard Deviation</u>	<u>Association with CR Completion†</u>
<b><u>Patient Assessment of Chronic Illness Care Total</u></b>	.95	2.77	1.14	.04
<b><u>Subscales</u></b>				
Patient Activation	.85	2.69	1.30	<.01
Delivery system / Practice design	.80	3.18	1.26	.02
Goal Setting / Tailoring	.90	2.78	1.29	.02
Problem Solving / Contextual	.88	3.00	1.33	.03
Follow-up/Coordination	.85	2.36	1.18	.48

†p-value from Student's t-test.

§scores range from 1-5, with higher scores indicating greater satisfaction.

CR=cardiac rehabilitation

Table 4: Mean ( $\pm$  standard deviation) Chronic Illness Resource Scores and their Association with Patient Satisfaction

	Mean Score $\xi$	Pearson Correlation	p
Chronic Illness Resources, Total	2.90 $\pm$ 0.61	.33	<0.001
Doctor and Health Care team	3.64 $\pm$ 0.99	.34	<0.001
Family and Friends	2.93 $\pm$ 0.97	.22	0.01
Personal	3.58 $\pm$ 0.87	.28	<.01
Neighborhood	2.59 $\pm$ 1.00	.07	0.43
Community	2.59 $\pm$ 0.91	.30	<.01
Organization	2.13 $\pm$ 1.01	.20	0.02
Work	3.18 $\pm$ 1.23	.06	0.62

$\xi$ scores range from 1-5, with higher scores indicating greater resources.

# Appendix A: Informed Consent Form

## CONSENT TO PARTICIPATE IN A RESEARCH STUDY

**Study Name: Cardiovascular Rehabilitation – Chronic Disease Management Program Evaluation and Cost-Effectiveness Analysis**

**Researchers:**

<b>Sherry L. Grace, PhD (Principal Investigator)</b>	<b>York University and University Health Network</b>
<b>Judy Murray, RN</b>	<b>Mackenzie Health, District Stroke Centre</b>
<b>Paul Oh, MD</b>	<b>University Health Network, Toronto Rehabilitation Institute</b>
<b>Nickan Motamedi (BSc Student)</b>	<b>York University</b>
<b>Yongyao Tan, MSc, CCRP (Research Associate)</b>	<b>University Health Network</b>
<b>Roni Jamnik, PhD</b>	<b>York University</b>
<b>Cassandra Collins (MfSc Student)</b>	<b>York University</b>

**Purpose of the Research:** You are being asked to take part in a research study. Please read this explanation about the study and its risks and benefits before you decide if you would like to take part. You should take as much time as you need to make your decision. You should ask the study staff to explain anything that you do not understand and make sure that all of your questions have been answered before signing this consent form. Before you make your decision, feel free to talk about this study with anyone you wish. Participation in this study is voluntary.

You have already agreed to participate in the York University Cardiovascular Rehabilitation (CR) Program. In this research study, we would like to include your information collected in this program for research purposes. We would like to use this information to learn how we can better meet the needs of our clients and to improve the services we provide. We would like to better understand how your quality of life, heart risk factors, knowledge, and health behaviors change following participation in CR. We are also interested in studying the cost-effectiveness of the services we provide to you.

**What You Will Be Asked to Do in the Research:** As part of our program, you will be asked to complete 4 surveys online: one at the beginning of the cardiovascular rehab program, one 6 months, 12 months, 24 months, and again 5 years later. The surveys include questions about your exercise and nutrition habits, medication adherence, quality of life, and mood. These questions help us understand how you are managing your health condition. Your completion of all surveys is voluntary.

If you consent to participate in this study, your survey responses would be used for research purposes. If your survey responses in the mood section suggest that you may have depressive symptoms, we will send a letter to your family doctor to let him/her know. We would also like to extract clinical information from your charts (e.g., disease history, other health problems, risk factors, exercise stress test results, cholesterol levels, your medications). Finally, we would also like your permission to link your information gathered from this program with a provincial database to determine your health care use and health outcomes over time. This would not require any paperwork on your behalf.

**Potential Benefits and Risks:** You may or may not receive any direct benefit from being in this study. Information learned from this study may help other people with your condition in the future.

There are no additional risks to you if you take part in this study. Being in this study may make you feel uncomfortable. You may refuse to answer questions if there is any discomfort.

As a general reminder, email may not always be a secure method of communication. For this study, email is being used for general communication purposes only, and will not be used to collect/provide personal health information. If you take part in this study, please be reminded that personal information will be collected in a de-identified manner through the online survey.

**Voluntary Participation:** Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the treatment you may be receiving, nature of the ongoing relationship you may have with the researchers or study staff, nature of your relationship with York University either now, or in the future.

**Withdrawal from the Study:** You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

**Confidentiality** If you agree to join this study, the study doctor and his/her study team will look at your personal health information and collect only the information they need for the study. Personal health information is any information that could be used to identify you and includes your:

- name,
- email address
- address,
- OHIP number, new or existing medical records, that includes types, dates and results of medical tests or procedures.



The information that is collected for the study will be kept in a locked and secure area by the study doctor for 10 years. Only the study team or the people or groups listed below will be allowed to look at your records.

Representatives of the York University's Ethics Review Board may look at the study records and at your personal health information to check that the information collected for the study is correct and to make sure the study followed proper laws and guidelines.

We are collaborating with some other programs, to study how self-management education varies in different programs. Therefore, parts of the information you provide in your survey may be securely and anonymously shared with the research investigators from this larger study.

Please note that any information that you provide for this study in the online survey, even though de-identified, when transferred to the U.S, is subject to U.S. laws, and in particular, to the U.S. Patriot Act. The US Patriot Act allows authorities access to the records of study participants in the event of auditing by authorities.

All information collected during this study, including your personal health information, will be kept confidential and will not be shared with anyone outside the study unless required by law. You will not be named in any reports, publications, or presentations that may come from this study.

If you decide to leave the study, the information about you that was collected before you left the study will still be used. No new information will be collected without your permission.

**Questions About the Research?** This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact the Sr. Manager & Policy Advisor for the Office of Research Ethics.

**Consent:**

I consent to participate in **Cardiovascular Rehabilitation – Chronic Disease Management Program Evaluation and Cost-Effectiveness Analysis** conducted by Dr. Sherry Grace. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by consenting.

Date: \_\_\_\_\_

## Appendix B: Case Report Form

### CR - Chronic Disease Management Evaluation Case Report Form (CRF)

Study ID #: \_\_\_\_\_

1. Site:

- UHN
- YCH
- Southlake

2. Patient Ineligible for Study:  Yes (if yes, specify below)  No

- |  |
|--|
| <input type="checkbox"/> Lack of proficiency in language of ICF and surveys<br><input type="checkbox"/> Other, please specify: _____ |
|--|

3. Patient Declined to Participate:

- No  Yes -Reason, if willing:

\_\_\_\_\_

**Stop here if patient is ineligible or declined.**

---

---

CRF Completed By: _____ Date: _____	CRF Entered By: _____ Date: _____
--	--------------------------------------

Study ID#: \_\_\_\_\_

	Yrs
--	-----

1. Age

2. Sex  Male

--	--	--

dd mmm Yyyy

Female

3. Inpt Admission Date

--	--	--

dd mmm Yyyy

4. Inpt Discharge Date

--	--	--

dd mmm Yyyy

5. Date CR Referral Received

--	--	--

dd mmm Yyyy

6. Date of CR Intake Appointment

--	--	--

dd mmm Yyyy

7. Expected Date of CR

8. Referral Indication (check all that apply)

- Cardiac
  - PCI
  - CABG Surgery and/or Valve surgery
  - Stable Angina / CAD
  - MI
  - HF
  - Congenital
  - Arrhythmia
- Stroke / TIA
- Diabetes
- Renal
- PVD
- Arthritis Clinic
- Other, please specify \_\_\_\_\_

3. CCS Angina Class:

- 0  1  2  3  4  
→  IV-a  IV-b  IV-c  IV-d

4. NYHA Functional Class:

- 1  2  3  4

5. LV Function:

- Nuclear  Echo  Angiogram

LVEF %: \_\_\_\_\_

Narrative: \_\_\_\_\_

- Normal  Mild  Moderate  Severe

Date assessed: \_\_\_\_\_

6. Complications during stay:

<input type="checkbox"/> Arrhythmia	<input type="checkbox"/> Cardiac Arrest
<input type="checkbox"/> Recurrent Angina / ischemia	<input type="checkbox"/> Pericarditis
<input type="checkbox"/> Cardiogenic shock	<input type="checkbox"/> Pneumonia
<input type="checkbox"/> Cerebrovascular Accident	<input type="checkbox"/> Acute Renal Fail
<input type="checkbox"/> Readmit (ICU / CCU)	<input type="checkbox"/> DVThrombosis
<input type="checkbox"/> Infection	<input type="checkbox"/> MI
	<input type="checkbox"/> Cardioversion
	<input type="checkbox"/> Cardiac Tamponade
	<input type="checkbox"/> Other: specify:

7. Risk Factors

Yes	No	Factor	Details			
<input type="checkbox"/>	<input type="checkbox"/>	Diabetes	Type	<input type="checkbox"/> Type I	<input type="checkbox"/> Type II	
			HbA1c%			
			Date assessed	dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Obesity (BMI>30)	BMI (kg/m2)			
			Waist circ (cm)			
			Date assessed	dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Hypertension	Blood Pressure (BP)	systolic	diastolic	
			Date assessed	dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Dyslipidemia	Total Cholesterol			
			HDL			
			LDL			
			Triglycerides			
			Date assessed	dd	mmm	yyyy

8. Previous cardiac diagnoses (check all that apply)?

<input type="checkbox"/> CAD	<input type="checkbox"/> Infection
<input type="checkbox"/> HF	<input type="checkbox"/> Valve condition
<input type="checkbox"/> Arrhythmia	<input type="checkbox"/> Cardiomyopathy
<input type="checkbox"/> Congenital HD	<input type="checkbox"/> Other: _____
<input type="checkbox"/> ACS/MI	<input type="checkbox"/> None

9. Comorbid Conditions (check all that apply)

- Cancer
- Hyperthyroid
- Liver Disease
- PAD/PVD
- Depression
- Renal Disease
- MSK / Joint Replacement, specify: \_\_\_\_\_
- Other: \_\_\_\_\_

10. Resting heart rate: \_\_\_\_\_

11. hs-CRP: \_\_\_\_\_

12. BNP: \_\_\_\_\_

13. CBC: \_\_\_\_\_

14. Intake Exercise Stress Test (circle one for each)

- a. Completed:  No  Yes, date: 

--	--	--
- b. Peak METs: \_\_\_\_\_
- c. Peak VO<sub>2</sub>: \_\_\_\_\_
- d.  GXT or  CPA
- e. symptom-limited?  Yes  No
- f. mode?  Treadmill  Bike
- g. Protocol?  Bruce  modified Bruce  Other, specify:
- h. Other comments:
- 
- 
- 

15. Intake Exercise Stress Test (circle one for each)

- a. Completed:  No  Yes, date: dd/mmm/yyyy
- b. Peak METs: \_\_\_\_\_
- c. Peak VO<sub>2</sub>: \_\_\_\_\_
- i.  GXT or  CPA
- j. symptom-limited?  Yes  No
- k. mode?  Treadmill  Bike
- l. Protocol?  Bruce  modified Bruce  Other, specify:

Other comments:

---

---

16. Current Medications (check all that apply):

- ACE Inhibitors
- Anti-coagulants
- ASA

- Ca<sup>2+</sup> antagonists
- Statin
- LL – fibrate
- LL – nicotinic acid
- LL – resin drugs
- Diuretics
- Clopidogrel or ticlopidine
- Other anti-platelet
- Nicotine Replacement
- Anti-arrhythmic
- Anti-platelets
- Beta-blockers
- Digoxin
- Nitrates (not PRN)
- ARBs
- Anti-depressant
- Coumadin
- Heparin
- HRT
- Insulin
- Oral hypoglycemic
- Anti-inflammatory
- Other \_\_\_\_\_
- Not reported in chart

17. Family Physician Name: \_\_\_\_\_

Phone #: \_\_\_\_\_

## Appendix C: Post-CR Chart Extraction Form

### CR - Chronic Disease Management Evaluation Discharge Assessment Data Extraction Form

Study ID #: \_\_\_\_\_

1. Today's 

--	--	--

 Date  
dd mmm yyyy

Completed By: _____ Date: _____	Entered By: _____ Date: _____
------------------------------------	----------------------------------

Study ID#: 

--	--	--

 \_\_\_\_\_

1. Program 

--	--	--

 elements utilized by patient (check all that apply):

- Education session(s)
- On-site exercise
- Home-based exercise program
- Dietitian consult
- Smoking cessation referral or consult
- Pharmacy consult
- Diabetes education referral or consult
- Stress management, or psychosocial referral / consult
- Other, please specify: \_\_\_\_\_

2. Number of Sessions prescribed: \_\_\_\_\_

3. Number of sessions completed: \_\_\_\_\_ or  information not available in chart

4. Any untoward events detected during exercise sessions:

- Yes, please specify: \_\_\_\_\_
- No
- Not documented in chart

5. Did the patient complete the program?  Yes  No

*If yes:* Date of graduation: \_\_\_\_\_



If *no*, reason indicated in chart?

No

Yes, please specify whether:

clinical

not clinical

Yes	No	Risk Factors	Details			
<input type="checkbox"/>	<input type="checkbox"/>	Diabetes	Type	<input type="checkbox"/> Type I	<input type="checkbox"/> Type II	
			HbA1c%			
			Date assessed			
				dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Obesity (BMI>30)	BMI (kg/m <sup>2</sup> )			
			Waist circ (cm)			
			Date assessed			
				dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Hypertension	Blood Pressure (BP)			
				systolic	diastolic	
			Date assessed			
				dd	mmm	yyyy
<input type="checkbox"/>	<input type="checkbox"/>	Dyslipidemia	Total Cholesterol			
			HDL			
			LDL			
			Triglycerides			
			Date assessed			
				dd	mmm	yyyy

6.

Study ID#: \_\_\_\_\_

1. Resting heart  
Date

dd	mmm	yyyy

rate: \_\_\_\_\_  
assessed

dd	mmm	yyyy

2. Discharge Exercise Stress Test

- a. Completed:  No  Yes, date: \_\_\_\_\_  
b. Peak METs: \_\_\_\_\_  
c. Peak VO2: \_\_\_\_\_

d.  GXT or  CPA (circle one for each)

e. symptom-limited?  Yes  No

f. mode?  Treadmill  Bike

g. Protocol?  Bruce  modified Bruce  Other,  
specify: \_\_\_\_\_

h. Other comments:

---

---

---

3. Chart indication discharge report mailed to other healthcare provider(s) involved in patient care?

- Yes  
 No

4. Medications at Discharge (check all that apply):

- ACE Inhibitors
- Anti-coagulants
- ASA
- Ca<sup>2+</sup> antagonists
- Statin
- LL – fibrate
- LL – nicotinic acid
- LL – resin drugs
- Diuretics
- Clopidogrel or ticlopidine
- Other anti-platelet
- Nicotine Replacement
- 
- Anti-arrhythmic
- Anti-platelets
- Beta-blockers
- Digoxin
- Nitrates (not PRN)
- ARBs
- Anti-depressant
- Coumadin
- Heparin
- HRT
- Insulin
- Oral hypoglycemic
- Anti-inflammatory
- Anti-arrhythmic
- Other: \_\_\_\_\_
- \_\_\_\_\_
- Not reported in chart

## Appendix D: PACIC

Staying healthy can be difficult when you have a chronic condition. We would like to learn about the type of help with your condition you get from your health care team. This might include your regular doctor, his or her nurse, or physician's assistant who treats your illness. Your answers will be kept confidential and will not be shared with your physician or clinic.

Over the past 6 months, when I received care for my chronic conditions, I was:

	None of the time	A little of the time	Some of the time	Most of the time	Always
1. Asked for my ideas when we made a treatment plan.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
2. Given choices about treatment to think about.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
3. Asked to talk about any problems with my medicines or their effects.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
<b><i>*Patient Activation (items 1-3)</i></b>					
4. Given a written list of things I should do to improve my health.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
5. Satisfied that my care was well organized.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
6. Shown how what I did to take care of myself influenced my condition.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
<b><i>*Delivery System/ Practice Design (items 4-6)</i></b>					
7. Asked to talk about my goals in caring for my condition.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
8. Helped to set specific goals to improve my eating or exercise.	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

9. Given a copy of my treatment plan. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

10. Encouraged to go to a specific group or class to help me cope with my chronic condition. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

11. Asked questions, either directly or on a survey, about my health habits. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

***Goal Setting (items 7-11)***

12. Sure that my doctor or nurse thought about my values, beliefs, and traditions when they recommended treatments to me. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

13. Helped to make a treatment plan that I could carry out in my daily life. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

14. Helped to plan ahead so I could take care of my condition even in hard times. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

15. Asked how my chronic condition affects my life. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

***Problem Solving/ Contextual (items 12-15)***

16. Contacted after a visit to see how things were going. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

17. Encouraged to attend programs in the community that could help me. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

18. Referred to a dietitian, health educator, or counselor. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

19. Told how my visits with other types of doctors, like an eye doctor or other specialist, helped my treatment. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

20. Asked how my visits with other doctors were going. <sub>1</sub> <sub>2</sub> <sub>3</sub> <sub>4</sub> <sub>5</sub>

***Follow-Up/ Coordination  
(items 16-20)***

## Appendix E: CR Utilization Items from Post-Test Survey

1. Did you attend a cardiovascular rehabilitation assessment (intake appointment)?

Yes →

(If Yes) 1. Where? \_\_\_\_\_

No →

2. How many minutes did you take you to travel there one-way? \_\_\_\_\_ mins

(If No) Why not?

2. Did you participate in cardiovascular rehabilitation?

Yes →

(If Yes) 1. What type of program did you attend? (please  one answer)

- Women-only hospital-based
- Men and women hospital-based
- Home-based

2. Approximately how many weeks passed between being discharged from hospital, and starting the cardiovascular rehab program? \_\_\_\_\_ wks

3. Did you consider this to be an acceptable or unacceptable length of time to wait?

- acceptable
- unacceptable

Why?

4. Approximately what percentage of vascular rehabilitation sessions did you complete on the phone or at the hospital?

\_\_\_\_\_ % of sessions completed

No →

(If No) Why not? Please be as specific as you can.

## Appendix F Duke Activity Status Index

**Instructions:** The following questions have to do with your current activity status. Please circle  Yes or  No in response to each question.

1.	Can you take care of yourself, that is, eating, dressing, bathing or using the toilet?	Yes	No
2.	Can you walk indoors, such as around your house?	Yes	No
3.	Can you walk a block or two on level ground?	Yes	No
4.	Can you climb a flight of stairs or walk up a hill?	Yes	No
5.	Can you run a short distance?	Yes	No
6.	Can you do light work around the house like dusting or washing dishes?	Yes	No
7.	Can you do moderate work around the house like vacuuming, sweeping floors, or carrying in the groceries?	Yes	No
8.	Can you do heavy work around the house like scrubbing floors, or lifting or moving heavy furniture?	Yes	No
9.	Can you do yard work like raking leaves, weeding or pushing a power mower?	Yes	No
10.	Can you have sexual relations?	Yes	No
11.	Can you participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?	Yes	No
12.	Can you participate in strenuous sports like swimming, singles tennis, football, basketball or skiing?	Yes	No



## Appendix G: Smoking Status

1) Please describe your smoking status (please check ONE box):

- I have never smoked (skip to Section J)
- I currently smoke
  - a. How many cigarettes per day on average? \_\_\_\_\_ cigarettes per day
  - b. For how many years have you smoked? \_\_\_\_\_ years
  - c. Do you find it difficult not to smoke in situations where you would normally do so?
    - Yes  No
  - d. Have you tried to stop smoking but found you could not?
    - Yes  No
- I quit smoking
  - e. When did you quit? Month \_\_\_\_\_ year \_\_\_\_\_
  - f. How many cigarettes per day did you smoke on average? \_\_\_\_\_ cigarettes per day
  - g. For how many years did you smoke? \_\_\_\_\_ years

## Appendix H: Godin Leisure-Time Exercise Questionnaire

1. During a typical **7-Day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your free time (write on each line the appropriate number).

Times per week

**a) STRENUOUS EXERCISE  
(HEART BEATS RAPIDLY)**

(Examples: running, jogging, hard long distance bicycling, cross country skiing, vigorous swimming)

\_\_\_\_\_

**b) MODERATE EXERCISE  
(NOT EXHAUSTING)**

(Examples: fast walking, easy bicycling, easy swimming, dancing)

\_\_\_\_\_

**c) MILD EXERCISE  
(MINIMAL EFFORT)**

(Examples: yoga, bowling, golf, easy walking)

\_\_\_\_\_

2. During a typical **7-Day period** (a week), in your leisure time, how often do you engage in any regular activity **long enough to work up a sweat** (heart beats rapidly)?

OFTEN

1.

SOMETIMES

2.

NEVER/RARELY

3.

## Appendix I: Health Promoting Lifestyle Profile II – Nutrition Subscale

**Instructions:** This questionnaire contains statements about your present personal nutrition habits.

Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by circling:

**N** for never, **S** for sometimes, **O** for often, or **R** for routinely

	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Routinely</b>
1. Eat 6-11 servings of bread, cereal, rice and pasta each day.	N	S	O	R
2. Eat 2-4 servings of fruit each day.	N	S	O	R
3. Eat 3-5 servings of vegetables each day.	N	S	O	R
4. Eat 2-3 servings of milk, yogurt or cheese each day.	N	S	O	R
5. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.	N	S	O	R
6. Eat breakfast.	N	S	O	R

## Appendix J: Morisky's Medication Adherence Scale – 4

**Instructions:** The following questions have to do with your prescribed medication.

Please circle  Yes or  No in response to each question.

- |  |     |    |
|--|-----|----|
| 1. Do you ever forget to take your medication?                                     | Yes | No |
| 2. Are you careless at times about taking your medication?                         | Yes | No |
| 3. When you feel better do you sometimes stop taking your medication?              | Yes | No |
| 4. Sometimes if you feel worse when you take your medicine, do you stop taking it? | Yes | No |

The Morisky Medication Adherence Scale is protected by US and international trademark and copyright laws. Permission for use is required. A license agreement is available from: MMAS Research LLC, 14725 NE 20<sup>th</sup> St., Bellevue WA 98007.

CR=cardiac rehabilitation

## Appendix K: Psychological Well-Being (Patient Health Questionnaire-8)

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things.	0	1	2	3
2. Feeling down, depressed, or hopeless.	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.	0	1	2	3
4. Feeling tired or having little energy.	0	1	2	3
5. Poor appetite or overeating.	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down.	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.	0	1	2	3

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult  
at all

Somewhat  
difficult

Very  
difficult

Extremely  
difficult