Title: Disease-related knowledge in cardiac rehabilitation enrollees: Correlates and changes

Short title: Disease-related knowledge in CR

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Highlights

- Participants starting CR have quite high knowledge regarding their disease.
- However, this knowledge decays at CR exit.
- Higher knowledge at CR initiation was related to greater educational attainment.
- It was also related to being married, English proficiency, and referral due to PCI.
- Great knowledge at CR exit was related to better diet and greater exercise.

Abstract

Objectives: to describe (1) patients' disease-related knowledge at cardiac rehabilitation (CR) entry; (2) correlates of this knowledge; (3) whether CR completion is related to knowledge; and (4) behavioral correlates of knowledge.

Methods: For this prospective, observational study, a convenience sample of new CR patients were approached at 3 programs to complete a survey. It consisted of sociodemographic items, heart-health behavior surveys, and the CADE-Q. Patients were provided a similar survey 6 months later.

Results: 214 patients completed the CADE-Q at both points, with scores demonstrating "acceptable" to "good" knowledge. Higher knowledge at CR entry was significantly associated with greater education, being married, greater English-language proficiency, and history of percutaneous coronary intervention (p=<.05). The 118 (55.1%) patients that completed CR demonstrated significantly higher knowledge than non-enrollees at post-test ($p \leq .05$). There was a significant positive association between knowledge and physical activity ($p \leq .01$) and nutrition ($p \leq .05$) at post-test, but no association with smoking or medication adherence.

Conclusions: CR adherence ensures patients sustain knowledge needed to optimize their disease management, and perhaps ultimately their health outcomes.

Practice implications: CR completion should be promoted so patients remain educated about their disease management, and the health behaviours observed will be practiced in a greater proportion of patients.

1. Introduction

Coronary Artery Disease (CAD) is a leading cause of morbidity worldwide [1]. It is a chronic condition that carries a high risk of recurrent events. Secondary prevention strategies are highly effective, but multi-factorial, necessitating patient awareness and adherence to optimize health outcomes [2-4]. Indeed, findings from recent systematic reviews demonstrate the importance of patient education in CAD patients, in improving self-management behaviors [5], health-related quality of life and potentially reducing healthcare costs [6]. While most CAD patients will receive some education if hospitalized, it is often forgotten, too brief, and focused appropriately on acute recovery (which leaves no time to educate on chronic self-management) [2, 5-8].

Cardiac rehabilitation (CR) is a comprehensive secondary prevention program, delivered by a multi-disciplinary team of healthcare providers. Patient education is considered a core component of CR [9]. CR sessions are delivered over several months permitting repeated patient contact with these providers, enabling fulsome education regarding the numerous lifestyle changes and treatments shown to reduce risk over time [8]. While the important role of patient education has been well-recognized in CR practice (e.g., clinical practice guidelines and quality indicators), patient knowledge in CR has only scantly been investigated.

To deliver effective patient education, educators must understand what information needs patients have when they enter CR, and what they already know from health education received at other points of their cardiac care journey [10]. Moreover, educators should be aware of social determinants of health, which may impact patient's health literacy. In accordance with Pender's Health Promotion Model on which this work

is based [11], they also need to consider the nature of the patient's cardiac condition, their individual risk factors, and their health behaviors to tailor and optimize education delivery [12]. Unfortunately, much previous literature on cardiac patient education has demonstrated that educators are often unaware or inaccurately-perceive patients' educational needs, as well as the characteristics affecting patients' ability to learn [6, 13-15]. Clearly, this can result in less engaged and informed patients, and thus potentially negatively impact not only their educational outcomes, but also their health outcomes.

The objectives of this study were: (1) to assess cardiac patients' disease-related knowledge at CR entry; (2) to investigate socio-demographic and clinical correlates of knowledge at CR entry; (3) to investigate whether CR completion is related to improvements in knowledge from CR entry to program completion; and (4) to investigate behavioral correlates of this post-CR knowledge.

2. Methods

2.1 Design and Procedure

This observational multi-site study was prospective in design. Ethics approval was obtained from the review boards at the 3 hospitals where the collaborating outpatient CR programs were located. Data was collected between February 2011 and December 2013, as part of their programs' evaluation. This research presents secondary analysis of the data collected at the first 2 assessment points (beginning of CR and after 6 months).

Patients were informed about the study at their first CR visit. They were provided with an information letter or consent form to take home and consider. Consenting patients were then invited to complete a self-administered confidential survey in paper format or online. The survey included sociodemographic items, 3 psychometrically-validated scales

to assess heart health behaviors (i.e., physical activity [16], nutrition [17], and medication adherence [18], as well as smoking. It also included a knowledge scale, namely the Coronary Artery Disease Education Questionnaire (CADE-Q) [19]. Clinical data were extracted from the patient's CR referral forms and CR intake assessment.

Six months later, patients were mailed or emailed a second survey to complete. It again assessed heart health behaviors and knowledge as per the initial survey. Non-responders were sent a follow-up survey. Clinical charts were reviewed to ascertain degree of CR participation and completion.

2.2 Participants and Setting

This study included cardiac patients recruited from 3 CR services in the Greater Toronto Area, Canada: one program was academic and two were adjacent to community hospitals in suburban settings. Each CR program was 4 to 6 months in duration, and each was based on the Canadian Association of Cardiovascular Prevention and Rehabilitation guidelines [2] and the Ontario CR pilot project [20].

All the CR programs had an education component, and 2 of the 3 programs had an early post-hospital discharge group education class. An interdisciplinary team provided education in all 3 programs, including information on exercise safety, nutrition, risk factor management, medications, stress management, and lifestyle changes. Two of 3 programs offered weekly talks in conjunction with patients' visits to the program for supervised exercise. Education was delivered in large and small group lectures, as well as individually in 2 of 3 programs. Handouts were provided in all programs, and an education book in 2 of 3 programs.

A convenience sample of patients was invited to participate in this study at their initial CR visit, for either education or intake assessment. The exclusion criteria were: lack of English-language proficiency, and any visual, cognitive or psychiatric condition that would preclude the participant from completing the surveys.

2.3 Measures

Clinical characteristics extracted from their medical records included: cardiac history, CR referral indication, comorbid conditions, cardiac risk factors, and functional capacity (from graded exercise test). Patients self-reported their sociodemographic characteristics, which included: marital status, racial / ethnic background, degree of English-language proficiency (1 ‘not comfortable’ to 5 ‘very comfortable’), employment status, and highest educational attainment.

CR participation and completion was determined through extraction from the CR charts 6 months after they completed the initial survey. At every CR visit, the patient's attendance was recorded, which enabled calculation of the percentage of prescribed sessions in which they participated. Completion of the CR program was defined in accordance with Canadian CR quality indicator [21], namely that “a 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”.

The CADE-Q assessed patients’ knowledge about CAD in 4 domains: (1) pathophysiology, and signs and symptoms of the disease; (2) risk factors and lifestyle; (3) diagnosis, treatment and medication; and, (4) physical exercise [19]. Each of the 19 items has 4 alternative response options, of which 1 is most correct (scored 3), 1 is somewhat accurate (scored 1), and 2 are incorrect (scored 0). These scores are summed, with a

maximum score of 57. The CADE-Q was originally developed and psychometrically-validated in Brazil [22]; it was later translated, cross culturally-adapted, and psychometrically-validated in English [19]. Both versions have good reliability and validity (Cronbach's alpha =0.81; intraclass correlation coefficient =0.85; criterion validity supported by significant differences in mean scores by family income and educational level; $p<0.01$) [19]. The items, response options and total score interpretation can be viewed at http://cadeq.files.wordpress.com.

2.4 Heart-Health Behaviors

Validated questionnaires were used to assess heart-health behaviors in both surveys. First, the Godin Leisure-Time Exercise Questionnaire (GLTEQ; Cronbach's alpha =0.83-0.85) is a 2-part instrument to assess usual leisure-time physical activity during a one-week period. For the first question, weekly frequencies of strenuous, moderate, and light-intensity activities are multiplied by the corresponding metabolic equivalent. Total weekly leisure activity is calculated by summing the products of these components. Part two of the questionnaire assesses how often participants engage in moderate to vigorous-intensity activity (*often, sometimes* or *never/rarely*) [16].

Second, the Health Promoting Lifestyle Profile (HPLP; Cronbach's alpha =0.92) II nutrition subscale contains 6 items that assess daily personal dietary habits. Response options range from 1 to 4 (*never* to *routinely*), indicating the frequency that a particular nutrition behaviour is practiced. Higher scores represent a more nutritionally-healthy diet [17].

Third, the Morisky Medication Adherence Scale (MMAS; Cronbach's alpha =0.61) is a 4-item validated questionnaire to assess prescribed pill-taking. Respondents

answer ‘yes’ or ‘no’ to each item. Higher scores indicate greater adherence to pharmacotherapy [18]. Finally, participants were asked to report whether they were current, former, or lifetime non-smokers.

2.5 Statistical Analysis

SPSS Version 20 was used (IBM Inc 2011, NY). Descriptive statistics were first computed to describe the sociodemographic and clinical characteristics of patients. These characteristics were then compared between those retained versus lost to follow-up, using chi-square and Student’s t-tests as applicable, to ascertain whether there was any retention bias in the sample.

To test the first objective, the mean CADE-Q scores were examined by item, subscale and overall. To test the second and fourth objectives, Spearman’s correlation, Wilcoxon rank and ANOVAs (as applicable) were computed. To test the third objective, t-tests and chi-square were computed. Finally, a General Linear Model was used to assess whether CR completion (independent variable) remained related to mean total CADE-Q scores (dependent variable) post-test, after adjusting for the sociodemographic and clinical variables that were significantly related to CADE-Q identified through the bivariate analyses undertaken in preliminary analyses outlined above, as well as CADE-Q scores at CR entry.

3. Results

3.1 Respondent Characteristics

Four hundred patients consented to participate in this study, of which 319 (79.8%) completed the intake survey and 214 (67.1%) completed the post-test survey, constituted

the retained sample for this study. A flow diagram of study participants is presented in Figure 1.

Sociodemographic and clinical characteristics of this retained sample are shown in Table 1, and compared with those who were lost-to-follow-up. The retained sample was significantly older (p=0.02), more often male (p=0.02), more often retired (p=0.02), and more often had coronary artery bypass graft surgery (p<0.001), and significantly less often had heart failure (p=0.013), congenital heart disease (p=0.003), stroke (p=0.007), myocardial infarction (p=0.03), type II diabetes (p=0.03), and obesity (p=0.006) than those who were lost to follow-up.

3.2 Knowledge at CR Entry & Correlates

Table 2 displays total, subscale and item knowledge scores at CR entry. There were no significant differences between CR sites in total knowledge (F=2.33; p=0.10). Results showed that the majority of the participants answered the "most correct" response on 14 (73.7%) of the items. Patients most often answered the following questions incorrectly: item 13 (n=141; 86.0%), item 10 (n=77; 47.0%), and item 11 (n=67; 40.9%). Items 13 and 11 pertain to physical activity. In regards to knowledge domains, there was no significant difference between subscales scores at CR entry.

Knowledge scores at CR entry are shown in Table 1 by patients' sociodemographic and clinical characteristics. Patients that were married, with greater English-language proficiency, higher educational attainment, and with a referral indication of percutaneous coronary intervention had significantly higher knowledge at CR entry compared with their counterparts. No other differences were observed.

3.3 CR Completion and Knowledge

There was no significant change in overall knowledge from CR entry to post-test in the retained sample; however as shown in Table 2, there was a trend towards lower knowledge at post-test. The decrease in knowledge appeared in relation to the physical activity domain, in particular guidelines for physical activity.

With regard to CR participation, patients completed a mean of 70.07±31.71% of prescribed sessions, and 118 (55.1%) completed the program. Patients who completed the CR program participated in a significantly greater percentage of sessions than non-completers (79.97±19.00% vs 35.45±24.75%, respectively; p=0.04). Knowledge scores at CR entry were unrelated to CR completion (p=.12). Knowledge scores changed a mean of -0.19 in completers and a mean of -3.42 in non-completers (p=.02).

At post-test, there were significant differences in knowledge by CR completion status. Table 2 displays total, subscale and item knowledge scores by completion. The positive association between total knowledge at post-test and CR completion was sustained (p=.02) even with adjustment for the sociodemographic variables which were associated with the CADE-Q at CR entry (i.e., marital status, English-language proficiency and higher educational attainment, as per Table 1; $F= 3.79$, $p < .001$), site and knowledge at CR entry. CR completers not only had significantly higher scores than non-completers overall, but also in the domain areas of diagnostic tests and treatments, and exercise. There was a trend towards higher knowledge of pathophysiology and risk factors among CR completers as well.

3.4 Behavioral correlates of knowledge

Table 3 displays mean heart-health behavior scores at CR entry and post-test. Patients reported a significant increase in exercise from CR entry to post-test, with a

trend toward improved nutrition. Medication adherence was quite high, and did not change. The number of patients smoking did not change significantly.

Table 3 also displays correlations between mean behavior scores and total CADE-Q scores at both assessment points. Results showed a significant positive correlation between knowledge scores and physical activity post-test ($p=0.001$), as well as knowledge scores and nutrition at both CR entry ($p=0.002$) and post-test ($p=0.03$). There were no associations with medication adherence or smoking.

4. Discussion and Conclusion

4.1 Discussion

Patients initiating CR had fairly good knowledge regarding their disease [22]. This may be due to inpatient education pre-CR, as well as early CR education (i.e. during intake). Higher knowledge at CR entry was significantly associated with greater educational attainment, being married, greater English-language proficiency, and with a referral indication of percutaneous coronary intervention. Patients who completed CR had significantly higher knowledge at post-test than patients who did not, supporting the impact of the patient education delivered in "real-world" CR practice. Moreover, while knowledge is not sufficient to achieve behavior change, indeed higher knowledge was associated with 2 recommended behaviors, namely physical activity and better diet.

In regards to the positive association between indicators of socioeconomic status and knowledge, results of this study were consistent with those in the literature [22-27]. Previous studies have also shown that patients with higher education may have better understanding and knowledge of their disease process and treatment [28], easier access to high-quality health care [29], including having a regular primary care physician [30],

consulting a cardiologist [31], and being adherent to therapeutic recommendations [32]. In addition, lower educational attainment has been shown to be associated with the inability to actively engage in self-management [25, 33-35].

The association of knowledge with behavior was also consistent with what has been reported in the CAD literature. For instance, a previous review has demonstrated that educational interventions are generally associated with improved physical activity and diet, however they also showed association with smoking cessation [5]. The lack of association observed herein may have been due to the small sample of smokers. Moreover, the results of the review supported a positive association between knowledge and medication adherence. Herein we did not observe such an association. This could be due to the influence of attitudes toward pharmacotherapy rather than knowledge on pill-taking behavior, or due to the brief version of the tool administered in this study, and the ceiling effect.

The novel contribution of this study is the finding that CAD knowledge likely decays following initial CR education. Moreover, continued participation in CR can sustain knowledge, whereas patients who drop-out of CR will forget some of the information needed to optimize their disease management, and perhaps ultimately their health outcomes.

Caution is warranted when interpreting these results. The chief limitation is potential selection bias. It is unknown how representative the sample was, given program staff did not record which patients they did and did not invite to participate. However, 80% of those who consented to participate went on to complete the initial survey. Given the fairly low rate of program completion observed, it is not likely the sample was biased

towards highly-adherent patients. Moreover, we cannot rule out the possibility that more educated and knowledgeable patients are represented in the sample, as they are aware of the need to participate in CR. Second, results are only generalizable to patients who are referred and attend an initial CR visit, which is a low proportion of cardiac outpatients [36]. Third, because educational program delivery is not highly standardized, whether the relationship between program completion and knowledge would be replicated in other communities of practice is not known. Education programs should be fully characterized in accordance with the Workgroup for Intervention Development and Evaluation Research (WIDER) reporting guideline [37]. Fourth, retention was moderate, and patients who were retained in the study were more likely older, female, and retired than those who were lost to follow-up, among other differences in their disease profile. Fifth, multiple comparisons were undertaken, which inflates error rates. Sixth, pre-test knowledge scores reported herein may not accurately reflect patient knowledge prior to CR initiation, as the timing of patient survey completion followed an initial visit where some education likely occurred. Seventh, the difference in knowledge scores between CR completers and non-completers, while statistically significant, was modest. Replication is warranted. Finally, due to design limitations, causal inferences regarding the association between knowledge and health behaviors should not be drawn.

4.2 Conclusion

In conclusion, patients initiating CR had fairly good knowledge regarding their disease. This may be due to previous health education delivery in the care continuum such as inpatient education pre-CR, as well as early CR education (i.e. during intake). One area where greater education was needed was exercise. Patients who completed CR

sustained their knowledge when compared to those who did not. Higher post-test knowledge was associated with better diet and exercise.

4.3 Practice Implications

There is a need to promote greater CR program participation and completion so patients remain educated about their disease management, and the health behaviours observed will be practiced in a greater proportion of patients.

"I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story".

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Table 1: Sociodemographic and Clinical Characteristics of Pre-CR Participants by Survey Retention Status (N=319), and Association of Knowledge scores pre-CR by these characteristics in the retained sample.

Characteristic	Pre-CR sample lost to follow-up (n=105)	Retained sample (n=214; 67.1%)	Knowledge scores of retained sample (mean±SD)	p*
Sociodemographic†				
Age, years (mean±SD)	61.74±11.29	66.1±9.3§	-	0.17
Sex, n (%)				0.99
Female	21 (20.9%)	66 (32.8%)§	40.10±7.06	
Male	60 (79.1%)	135 (67.2%)	40.11±8.03	
Marital status, n (%)				0.05
Married	72 (69.2%)	165 (77.5%)	40.84±6.44	
Not married	32 (30.8%)	48 (22.5%)	36.40±10.11	
Racial / Ethnic background, n (%)				0.97
North American	40 (38.1%)	87 (41.6%)	40.43±6.21	
Others ‖	65 (61.9%)	125 (58.4%)	39.43±8.57	
English-Language Proficiency (mean±SD) ¶	3.72±0.66	3.83±0.50	-	<.001
Work status, n (%)				0.50
Retired	33 (31.7%)	113 (53.1%)§	39.88±7.58	
Other	71 (67.6%)	100 (46.9%)	39.90±7.61	
Highest Educational Attainment, n (%)				.003
Less than college or university	53 (51.0%)	108 (50.5%)	38.23±8.17	
Completed college or university or higher	51 (49.0%)	105 (49.1%)	41.45±6.65	
Clinical, n (% yes)				
Referral Indication‡				

Heart Failure	7 (8.4%)	9 (4.6%)§	39.29±8.02	0.83
Congenital Heart Disease	3 (3.6%)§	2 (1.0%)	38.50±4.95	0.52
Stroke/Transient Ischemic Attack	9 (10.8%)§	12 (6.2%)	36.30±7.70	0.70
Arrhythmia	7 (8.4%)	19 (9.8%)	35.44±8.68	0.97
Myocardial Infarction	26 (31.3%)§	49 (25.0%)	40.55±6.21	0.15
Coronary Artery Bypass Graft Surgery	18 (21.4%)	59 (30.4%)§	39.54±7.88	0.89
Percutaneous Coronary Intervention	33 (39.3%)	77 (39.3%)	41.46±6.00	0.02
Risk factors				
Hypertension‡	65 (80.2%)	145 (75.9%)	39.89±7.01	0.42
Dyslipidemia‡	67 (83.8%)	146 (79.8%)	39.72±7.66	0.61
Type II Diabetes‡	14 (13.3%)§	25 (11.7%)	41.00±10.40	0.59
Obesity‡	42 (53.8%)§	64 (34.0%)	39.87±8.60	0.25
Smoking Status†				0.44
Current smoker	6 (5.9%)	8 (3.8%)	42.43±4.69	
Never smoked	38 (37.6%)	91 (43.1%)	40.43±7.28	
Former smoker	57 (56.4%)	112 (53.1%)	39.30±8.02	

CR indicates cardiac rehabilitation, SD standard deviation.
*F test, t-test or Pearson's correlation, as appropriate for association with CADE-Q scores.
§p<.05; Significant differences between retained and unretained samples based on chi-square or t-tests as applicable.
†Self-reported
‡Extracted from medical chart
|| British Isles, Southern European, Eastern European, Jewish, South Asian, East or Southeast Asian, Western European, Multiple Backgrounds, and Caribbean.
¶English-language proficiency response options: 1=not comfortable; 2= I can get by, but more comfortable with another language; 3= fairly comfortable; and 4= very comfortable

Table 2: Total, subscale and item knowledge scores in retained sample at pre- and post–test, and at post-test by CR completion status

Knowledge scores (mean±SD)		Retained Sample (n=214)			CR Completion Status (n=214)		
	Maximum possible score	Pre-Test	Post-Test	p*	Yes (n=118; 55.1%)	No (n=95; 44.4%)	p†
Total Knowledge	57	40.15±7.53	39.14±8.11	0.07	39.96±7.17	36.96±8.87	0.02
Subscales							
1. Pathophysiology	15	12.37±2.95	12.21±3.31	0.52	12.38±3.13	11.63±3.43	0.164
2. Risk Factors	24	17.83±3.96	17.33±4.04	0.08	17.33±3.89	17.09±4.10	0.72
3. Diagnostic Tests, Treatment, Medications	24	15.70±3.30	15.63±3.10	0.78	15.75±3.03	14.60±3.41	0.03
4. Exercise	24	16.63±2.34	16.01±3.51	0.04	16.57±3.23	15.40±3.33	0.04
Items	3						
1.Coronary Artery Disease is:		2.38±1.09	2.43±1.07	0.60	2.51±0.99	2.29±1.20	0.25
2. Which factors have the most influence on the risk of myocardial infarction?		2.67±0.93	2.49±1.12	0.07	2.45±1.16	2.56±1.07	0.55
3. Which description below is a typical symptom of CAD?		2.53±0.96	2.51±1.00	0.84	2.54±0.98	2.29±1.15	0.18
4. Which of the following statements is most accurate regarding our understanding of CAD?		2.69±0.86	2.69±0.89	1.00	2.74±0.81	2.46±1.15	0.12
5. The best time of the day for people with coronary disease to carry out their prescribed exercise is:		2.648±0.93	2.62±0.95	0.83	2,68±0.86	2.52±1.03	0.35
6. Of the investigations listed below, which ones provide the most precise information about the diagnosis and prognosis of CAD?		1.10±0.86	1.12±0.85	0.89	1.16±0.86	1.08±0.90	0.61
7. Which of the following statements about the management of blood cholesterol levels is most accurate?		2.81±0.68	2.76±0.77	0.50	2.81±0.67	2.60±0.98	0.19
8. Which of the following statements about the use of “nitroglycerin” is most accurate?		2.21±1.13	2.08±1.16	0.16	2.11±1.16	1.79±1.22	0.12

9. Which of the following dietary components best describes a nutritional plan for persons with CAD?	1.49±0.90	1.45±0.88	0.63	1.47±0.86	1.54±1.03	0.67
10. Which values for LDL cholesterol and HDL cholesterol are the optimal targets persons with established CAD (values in mmol/litre)?	1.47±1.44	1.48±1.40	0.95	1.47±0.88	1.38±0.92	0.68
11. In which of the following situations would you avoid carrying out your regular physical exercise?	1.56±1.41	1.50±1.41	0.65	1.58±1.42	1.02±1.28	0.01
12. While walking, if you experience a new episode of severe chest discomfort that you think that is angina, you should:	2.66±0.84	2.71±0.80	0.47	2.65±0.89	2.58±0.90	0.66
13. Based on your knowledge about exercise and CAD, choose the most appropriate statement below:	0.13±0.34	0.14±0.35	0.73	0.16±0.42	0.19±0.39	0.66
14. Guidelines for Physical Activity for people with coronary disease should be based upon which of the following:	2.74±0.70	2.44±0.97	0.001	2.55±0.86	2.50±0.95	0.73
15. Which of the following changes in the body resulting from regular physical exercise are most important to long term cardiac health?	2.12±1.16	1.88±1.26	0.03	1.93±1.23	2.00±1.24	0.75
16. Which of the following statements best describes the pattern for exercise activity in persons recovering from a heart event:	1.74±1.48	1.67±1.50	0.66	1.93±1.44	1.50±1.52	0.10
17. Which of the following statements is the most appropriate guidance around levels of blood pressure levels in persons with CAD:	2.44±1.02	2.47±1.01	0.71	2.49±0.99	2.23±1.19	0.19
18. Which of the statements below regarding psychological stress is most correct?	1.91±1.18	1.81±1.21	0.35	1.80±1.18	1.67±1.19	0.51
19. Which interventions can extend and improve a patient's quality of life for persons recovering from a cardiac event?	2.88±0.51	2.87±0.56	0.70	2.92±0.43	2.75±0.76	0.15§

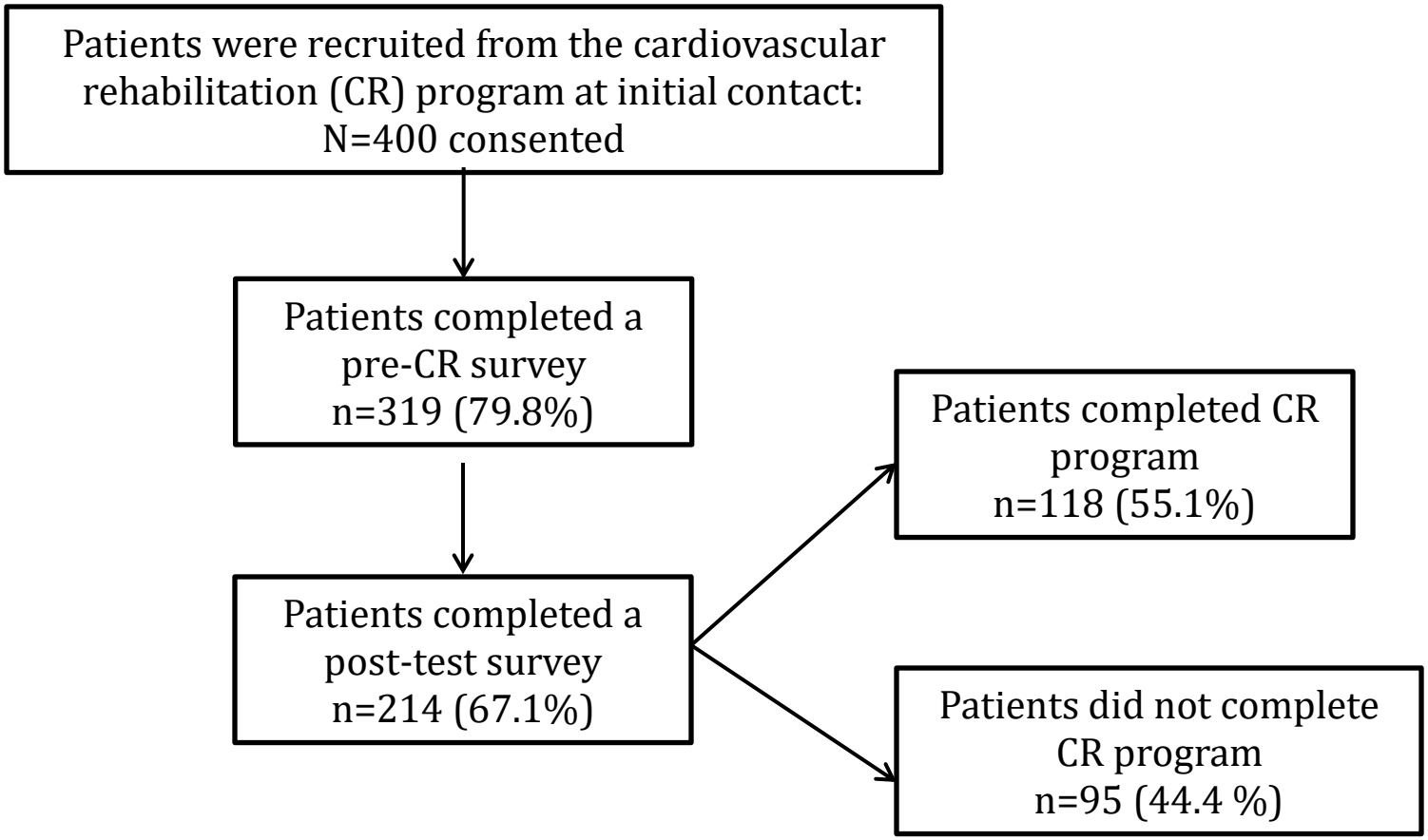
SD indicates standard deviation, CR cardiac rehabilitation, CAD coronary artery disease, LDL low-density lipoprotein, HDL high-density lipoprotein.
*Paired t-test between pre and post-CR knowledge scores.
†Independent sample t-test between knowledge scores in CR completers and non-completers.
‡The t-test could not be performed because the standard error of the difference was zero.
§Statistically significant where Bonferroni correction applied (p=0.05/19=0.003).

Table 3: Heart health behaviors at pre and post-test, and relation to knowledge

Behaviors (mean±SD)	Retained Sample (n=214)			Correlations with total CADE-Q*	
	Pre-test	Post-test	p	Pre-test	Post-test
Exercise	30.67±22.02	40.92±39.3	<.001	0.10	0.25††
Diet‡	2.99±0.53	3.06±0.51	0.07	0.24††	0.15†
Medication Adherence§	3.62±0.69	3.60±0.65	0.92	0.11	0.02
Smoking (n, % current)	8 (3.8%)	10 (4.7%)	0.85	-0.11	0.29

SD indicates standard deviation; CADE-Q Coronary Artery Disease Education Questionnaire.
*Spearman's rho correlation coefficient.
† $p < 0.05$; †† $p < 0.01$
‡ scores range from 1-4, with higher scores denoting better nutrition.
§ scores range from 1-4, with higher scores denoting better adherence.

Figure 1: Diagram of Participant Flow



Note: CR completion status was missing for 1 patient.