Title: Cardiac Rehabilitation Component Attendance: Impact of Intervening Clinical Events, as well as Disease Severity and Risk Factor Burden

Short Title: CR Component Attendance & Risk Factors

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Abstract

Purpose: To examine: (1) the rate of clinical events precluding cardiac rehabilitation (CR) continuation, (2) CR attendance by component in those without events, and (3) the association between disease severity (e.g., tobacco use, diabetes, and depression) and component attendance (e.g., exercise, diet, stress management, tobacco cessation).

Methods: Retrospective analysis of electronic records of the CR program in London, Ontario from 1999-2017. Patients in the supervised program are offered exercise sessions twice per week, with a minimum of 48 prescribed sessions tailored to patient need. Patients attending ≥1 session without major factors that would limit their exercise ability were included. Intervening events were recorded, as was component attendance.

Results: Of 5508 enrolled, supervised patients, 3696 did not have a condition that could preclude exercise. Of these, one-sixth (n=912) had an intervening event; these patients were less likely to work, more likely to have medical risk factors, had more severe angina and depression, and lower functional capacity. The remaining cohort attended a mean of 26.49±21.30 sessions overall (median=27; 19.36% attending ≥48 sessions), including 20.49±17.45 exercise sessions (median=21). After exercise, the most common components attended were individual dietary and psychological counselling. Patients with more severe angina and depressive symptoms as well as tobacco users attended significantly fewer total sessions, but more of some specific components.

Conclusions: In 1/6 of patients, CR attendance and completion are impacted by clinical factors beyond their control. Many patients are taking advantage of components specific to their risk factors, buttressing the value of individually-tailored, menu-based programming.

Condensed Abstract:

In this 20-year cohort of CR patients, one-sixth had an intervening event requiring exercise cessation. After exercise sessions, the most common components attended among those without events were individual dietary and psychological counselling. Depressed, smoking patients attended fewer sessions overall, but more specific components related to their risk factors.

INTRODUCTION

Cardiovascular diseases (CVD) are among the leading causes of disability, accounting for 10% of disability-adjusted life years lost world-wide[1]. Patients with CVD are at higher risk of suffering another cardiac event than those without[2]. Cardiac rehabilitation (CR) is an outpatient chronic disease management model of care, where patients receive structured exercise, as well as lifestyle (e.g., diet, tobacco cessation) and psychosocial counselling to control risk factors (i.e., core components)[3]. CR participation is associated with reduced CV mortality by 26% and hospital re-admission by 18%, as well as improved quality of life[4].

It is well-established that more CR sessions (i.e., in-person visit, during which component[s] are delivered) are associated with better outcomes[5]. While prescribed overall session "dose" varies internationally[6], program attendance is generally lower than what is prescribed[7]. There are no reviews establishing rate of program adherence in the literature, and the degree to which patients adhere to the different components of CR other than exercise are generally not considered. This is important as CR is individually-tailored and menu-based, so some components may be more needed by some patients (e.g., stress management for depressed patients, dietary counselling for diabetes and heart failure patients; HF), while others may not be applicable (e.g., non-tobacco users would not attend tobacco cessation counselling).

It is also well-established that certain patient groups are less likely to adhere to CR and complete it[8–10]. This often relates to the social determinants of health, including sex/gender, among other factors[11,12], such that frequently patients who would benefit most dropout. However, conflicting findings for some of these factors abound in this literature (e.g., depressed patients, age, work status/retirement)[13]. Moreover, sicker patients may not be able to attend CR sessions as readily (e.g., HF), yet this is rarely taken into consideration when examining CR

attendance. Furthermore, while CR participation is associated with fewer subsequent events, given the high rate of cardiovascular sequelae in this population as outlined above (e.g., symptoms, HF exacerbation), a non-trivial proportion of patients will experience a clinical event, particularly early in the course of CR[14]. This would render the patient unsafe for continued exercise until the clinical issue is stabilized (i.e., so-called "medical holds"), and hence they would perhaps not complete the program or participate in fewer sessions. Thus, there could be confounding that is not considered to our knowledge in the literature, regarding clinical factors associated with CR participation. Accordingly, the objectives of this study were to: (1) describe how many patients have clinical events (and what they are) during CR that would impact attendance/dose received (i.e., program interruption); in those without such clinical events, (2) describe CR component type in which patients participate (i.e., exercise, diet, psychosocial, tobacco cessation), and the number of sessions of each; as well as (3) investigate whether having disease severity indicators/risk factor burden (i.e., tobacco user, diabetes, HF, Canadian Cardiovascular Society [CCS] angina class I, II or III[15], and elevated depressive symptoms) impacts the CR component type in which patients participate, and the number of sessions of each (as per objective 2).

METHODS

DESIGN AND PROCEDURES

This was a retrospective, single-center cohort study. The study was approved by Western University's Human Research Ethics Board (HREB; London, Ontario, Canada) and York University's Office of Research Ethics (Toronto). The HREB approved a waiver of informed consent. Data were routinely-collected in the electronic medical record (i.e., database) pre and post-program; relevant variables were extracted anonymously for the current study.

Participants

The study period was January 1, 1999-December 31, 2017. Adult patients with a cardiac event who were referred to CR were included in the study. Only those who attended at least 1 session were included, such that they attended at least one exercise class following intake assessment. There were several exclusion criteria. Patients who attended home-based CR were excluded, as session dose would be operationalized differently (i.e., calls vs visits, also offered at different frequencies and differential access to education sessions). Patients who had a history of stroke or peripheral vascular disease, or who had New York Heart Association (NYHA)[16] or CCS Angina class IV[15] were excluded, as it was assumed they would have limits to their exercise ability. In addition, some patients came back for CR after another cardiac event post-graduation; only the first CR program was used for all patients. Finally, intervening clinical events which precluded exercise were considered throughout the program; those patients experiencing one were excluded from the analysis for objectives 2 and 3.

Setting

The outpatient CR program of the academic cardiac program in London, Canada is offered at no cost to patients. Eligible inpatients (at hospital discharge) and outpatients are accepted following physician referral. The program is 6-8 months in duration. There is an initial comprehensive medical history taken and assessment (e.g. comorbidities, disease severity, risk factors, psychosocial well-being, graded stress test), based on which individualized CR programming is determined, in consultation with the patient.

Patients in the supervised program are offered 2 sessions/week of structured exercise at a local community centre (i.e., ≥48 sessions). Given the program duration was individualized

based upon patient's need, prescribed supervised exercise was often upwards of 58 to 64 sessions, although in some cases patients could stay in the program longer.

Based on individual patient need and preference as well, patients are also offered education sessions, dietary counselling (individual or group), group stress management sessions (8-10 sessions of education and cognitive-behavioral techniques offered to all patients through 2012), and exercise counselling sessions (individual and group). Individual psychology sessions were offered to patients who scored >7 on either one of the anxiety and depression subscale [i.e., "elevated" symptoms], or >13 overall on the Hospital Anxiety and Depression Scale (HADS[17]), or based on clinician judgment or patient request; this comprised a combination of cognitive-behavioral and psychodynamic approaches delivered by a psychologist. Tobacco users were offered group or individual cessation counselling sessions, with number of sessions based on individual patient need. These were all offered at the hospital, except group exercise education sessions were offered coincident with exercise training at the community centre.

Patients experiencing intervening clinical events that may impact their safety to exercise were reviewed by the program nurse and physician and recorded in the electronic CR record. Those deemed unsafe were put on hold until they were safe to resume, at which point they were offered 3 more months of programming, regardless of the amount of the program they had completed to date.

MEASURES

Sociodemographic and clinical characteristics

The sociodemographic characteristics of CR participants were extracted from the CR electronic medical record, including age, sex, highest educational attainment, work status, and living situation. The clinical characteristics examined included referral indication (e.g., acute coronary

syndrome, and/or revascularization, HF), and cardiovascular risk factors (e.g., dyslipidemia, hypertension, anthropometrics, diabetes, self-reported tobacco use). Major cardiac medication classes patients were taking were recorded (i.e., statins, beta-blockers). Peak metabolic equivalents of task (METs) from the CR entry graded exercise test was extracted. Quality of life was measured with the SF-12[18].

Intervening clinical events

With regard to objective 1, the following events/procedures that happened after CR program initiation and warranted program interruption were considered: acute coronary syndrome, coronary revascularization, transient ischemic attack / stroke, valve procedures, cardiomyopathy, pulmonary diseases, and peripheral vascular diseases among others (Table 2). New-onset HF that was not stable or an acute exacerbation precluding exercise were also considered. All events were reported by patients and/or identified in the electronic records from the hospital electronic health record. The CR nurse also actively checked for events in all patients in the hospital electronic record at program exit. The nurse entered all clinical event data.

CR component attendance and session dose received

With regard to objective 2, component attended was recorded in the electronic CR record/database, whether group or individual: exercise, diet, psychosocial, and tobacco cessation (Table 3). Number of sessions attended was also extracted for each component and total sessions computed; percent of those prescribed for supervised exercise could also computed as the number was the same for all patients. Note that over and above tobacco cessation counselling, participants were offered nicotine replacement therapy and pharmacotherapy.

Disease severity indicators / risk factor burden

With regard to objective 3, disease severity indicators/risk factor burden were considered, as it was assumed some of these may impact attendance/dose received, or affect participant's degree of motivation/program adherence[19]. These were: diabetes (type I or II; risk factor), HF (disease severity indicator), CCS angina class II or III[15] (disease severity indicator; those with class IV were excluded for safety reasons, but class I participants would have no limits to fully participating), tobacco use (risk factor) and elevated depressive symptoms (i.e., , >7 on the depression subscale of the Hospital Anxiety and Depression Scale; risk factor)[17].

Statistical analyses

All analyses were performed using SPSS statistical software Version 24.0[20]. The cut-off value for p was set as 0.05 for all analyses, except as specified below.

After selecting patients for inclusion in the cohort, intervening events were examined. Differences in sociodemographic and clinical characteristics of participants excluded, having an intervening event, versus those retained to examine dose and component attendance were tested using chi-square or analysis of variance, as appropriate.

CR component and session attendance/dose received was described in the retained cohort. Association of total session attendance/dose and exercise session attendance/dose with sociodemographic and clinical characteristics was examined using non-parametric tests as dose was not normally distributed (Mann-Whitney U or Spearman correlation as applicable). A more conservative p-value of <.001 was applied due to the multiple comparisons. Finally, types of CR sessions (components) and total sessions were compared by disease severity indicators/risk

factor burden using Mann-Whitney U tests (more conservative p-value threshold not applied due to novel nature of analyses).

RESULTS

There were 5,508 patients in the cohort that attended ≥ 1 session. Of these, 3,696 (67.10%) did not attend home-based CR (n=1812, 31.10%), had no history of stroke or peripheral vascular disease, and did not have an NYHA or CCS class of IV at initial assessment. Their characteristics are presented in Table 1.

With regard to objective 1, there were 1,328 (24.11%) intervening events in the cohort, experienced by 912 (16.60%) patients (Table 2; n=250, 27.40% women; p=0.55). As shown, these were most commonly acute coronary syndrome events and/ or revascularization procedures; there were no deaths during CR. Among the retained patients without intervening events, 527 (18.92%) had elevated depressive symptoms, 519 (18.64%) were diabetic, 501 (17.99%) were current tobacco users, 84 (3.02%) had CCS class >1, and 74 (2.65%) patients had HF (Table 3).

As shown in Table 1, there were differences in the sociodemographic and clinical characteristics of the groups at intake.

CR Components and session dose

As per objective 2, mean overall CR attendance, and attendance by component are shown in Table 3. The median total number of sessions attended was 27 (Q25-Q75=3-45); the median was 21 for supervised exercise sessions (Q25-Q75 = 0-37). Overall, 539 (19.36%) participants completed the ~48 prescribed sessions.

Table 1 also displays the association between sociodemographic and clinical characteristics pre-CR with total and exercise session attendance or dose. As per objective 3, Table 3 also displays CR component type and session attendance/dose of each and overall in those with disease severity indicators/risk factor burden. CCS Class >1, tobacco use and elevated depressive symptoms were significantly associated with lower total dose; HF and diabetes were not related to overall dose. With regard to specific components, patients with HF attended significantly fewer group dietary sessions. Participants with diabetes attended significantly more exercise counselling and tobacco cessation sessions, but less group dietary counselling than their non-diabetic counterparts. Patients with higher CCS class attended fewer exercise sessions and group exercise counselling sessions. Those smoking at program start attended on average one tobacco cessation session. They attended significantly fewer supervised exercise sessions, exercise counselling (group and individual), and individual dietary counselling sessions, but attended more individual psychology and group dietary sessions than non-tobacco users. Finally, participants with elevated depressive symptoms attended significantly less of all components than those with subthreshold symptoms, except they attended significantly more psychosocial sessions (group and individual; Table 3).

DISCUSSION

In this large cohort, across 20 years, approximately one-sixth of the cohort had an event or procedure after program initiation and before program completion (objective 1), which clearly, and appropriately, impacts overall program attendance rates. Adherence to CR in those without a documented clinical reason precluding safe exercise was demonstrated to be about half of sessions, but overall patients got an ample “dose” of CR to achieve mortality and morbidity reductions (objective 2). Patient groups at greater need of risk reduction, such as depressed

patients and smokers, were shown again to be less likely to adhere to exercise sessions than their less complex counterparts, but they do seem to be appropriately taking greater advantage of other components specific to their needs, with particular use of individual over group counselling and education (objective 3). While consideration of social determinants of health to promote optimal CR use is important[21], the impact of clinical factors warrant close attention as well.

The degree of intervening clinical events highlights the importance of considering program policies regarding CR resumption (and not program termination) where patients experience a new clinical event after enrolment, as well as guideline or consensus statement recommendations on how to handle safety to return and optimally engage patients in the program upon their return. The most common events were myocardial infarctions, followed by percutaneous coronary interventions-- procedures from which most patients could likely return to CR in a few days[22]. This program had the capacity to offer patients a full 3 months further programming to best optimize secondary prevention where patients had recurrent events. Many programs however are limited in their capacity and resources, and thus have less flexibility, but we should consider ways to model programs so potentially some patients who are safe to resume can "backfill" the spots of the patients who have to withdraw temporarily from the program until their clinical status stabilizes.

Findings with regard to factors associated with overall session use, such as education, ethnocultural background, social support, waist circumference, tobacco use, and "healthy adherers"[23] to medications, were fairly consistent with the literature. It was surprising women did not participate in fewer sessions than men, but this could be due to consideration of use of non-exercise sessions. In the case of diabetes patients in particular however, where the literature suggests patients are less likely to adhere, it was encouraging they participated in more exercise

counselling and tobacco cessation sessions. Similarly, tobacco users were found to adhere less, and so we must do more to engage this group in CR, but they did more often attend psychological and dietary sessions. Participants with elevated depressive symptoms were indeed more likely to engage in the psychosocial component; this is encouraging given the high burden of mental distress in chronic disease patients, that it often goes unrecognized and untreated[24], and the proven effects of the psychosocial component in particular in reducing mortality[25]. They were unfortunately less likely to engage in supervised exercise, which is ameliorative not only for their physical, but also their mental health[26]. Patients with greater angina symptom burden at intake also participated in fewer supervised exercise sessions, despite the fact that they likely have more to gain[27]. Again, we must do more to engage these vulnerable sub-populations (i.e., poorer outcomes, but less participation). Overall, it does appear that CR programs can engage patients in the types of sessions/core components they need (i.e., individual tailoring), so patients can meet their rehabilitation goals.

Clinical, policy and research implications

There are several implications of this study. First, program adherence must be optimized for patients to derive maximum benefit. The latest Cochrane review on CR utilization interventions establishes that the interventions in the field do indeed significantly augment program adherence and completion[28]. Meta-regression analyses revealed adherence may be greater when at least some of CR is delivered remotely. In this cohort, home-based CR participants were excluded, but ultimately the impact of home-based CR on utilization warrants further investigation as operationalization of adherence is not comparable in supervised and unsupervised settings[29].

Second, the study buttresses guideline recommendations for menu-based CR, whereby patients are offered components based on their risk and preferences. For example, tobacco-using patients did take advantage of the tobacco cessation as well as psychosocial components. While these patients were shown to be less likely to attend exercise sessions, as has oft been shown in the literature, by examining attendance by component as we have done here, we can better understand the way patients want to engage with CR. A similar finding was observed with depressed patients; while they were significantly less likely to take advantage of the non-psychosocial components of the program, they were more likely to take advantage of the group and individual psychosocial programming, which likely met their needs quite well.

There are some directions for future research which arise based on these findings. This program did not offer return-to-work counselling, as many programs do not[30], so use of that would be important to investigate in future research. Work status is often associated with program attendance. Also, the type and degree of intervening events changed over the 20-year history of this study. In addition to establishing rates of clinical events in CR cohorts that can be expected by programs as outlined below, this should be considered based on the current era of treatment and average patient presentation. This will enable programs to better plan to meet the needs of these patients, so their outcomes can be optimized.

Limitations

Chiefly, generalizability is limited because the study was conducted at a single centre. Further research in other cohorts is needed to determine whether the incidence and type of intervening clinical events are generally consistent, as well as burden of greater disease severity and risk factors, as this may vary in different jurisdictions. Moreover, there is great heterogeneity in components delivered and number of sessions offered at CR programs. At this centre, patients

were offered many more sessions than is normative globally[6]. Adherence to fewer prescribed sessions would likely not be proportional. Moreover, exercise sessions were offered at a community centre whereas other components were offered at the hospital, which may have differentially impacted access for patients. The study was also conducted in a universal healthcare system where the patients accessed CR at no cost (other than transportation and parking); In other jurisdictions, cost may hinder participation. Home-based participants were not considered, nor were patients with vascular diseases other than cardiac, again limiting generalizability. Moreover, there were many differences in sociodemographic and clinical characteristics between the selected cohort and excluded patients, although some of these are likely an artifact of the large sample size.

Second, future research should investigate the impact of these clinical factors on percentage of prescribed sessions attended, to establish whether the findings herein are robust. Third, many tests of association were undertaken for this exploratory study, increasing the chance of type I error. For the correlates of session attendance/dose, which have often been studied, a more conservative p-value was applied to mitigate this. But again, replication is needed. Finally, due to the nature of the design, causal conclusions cannot be drawn.

In conclusion, to the best of our knowledge, we believe that we are the first to account for the not insignificant incidence of clinical events when quantifying the associations of a broad spectrum of clinical and psychological factors on adherence and use of usual CR service components. While CR dose received (or session attendance) is likely largely due to patient-related preference as well as access, other factors, such as reverse causality with clinical factors, could not be excluded. Clinical factors and patient preference should always be considered when working to optimize the dose and comprehensiveness of CR service components that patients

receive, to optimize the many benefits of CR participation. By considering more closely the types of sessions offered and the corresponding types of risk factors or needs of patients, a clearer picture emerges around use of not just the exercise, but the other core components of CR as well.

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Table 1: Participant's pre-CR characteristics by retention status and intervening clinical events.

	Had intervening event n=912 (16.6%)	Retained without intervening event [a, b] n=2784 (50.5%)	Excluded n=1812 (32.9%)	Total N=5,508[c]
Sociodemographic Characteristics				
Sex (% women)	250 (27%)	757 (27%)	469 (26%)	1476 (27%)
Age (years)	62.0 ± 12.1	60.6 ± 11.9 [ab]	61.8 ± 11.5	61.3 ± 11.8[f]
Work status (% full or part-time)	239 (12%)	780 (31%) [b]	645 (36%)	1664 (32%)[f]
Ethnocultural background (% white)	819 (95%)	2278 (93%)[ab]	1681 (94%)	4778 (94%)[f]
Highest education (% some college/university or greater)	327 (38%)	936 (39%) [ab]	626 (36%)	1889 (38%)[f]
Living situation (% alone)	157 (19%)	395 (17%) [ab]	266 (15%)	818 (16%)
Clinical Characteristics				
Risk Factors				
Sedentary lifestyle (% yes)	479 (53%)	1438 (52%)[ab]	1106 (61%)	3023 (55%)[f]
Body mass index (kg/m^2)	29.4 ± 5.3	29.2 ± 5.7	28.7 ± 4.9	29.1 ± 5.4[e]
Waist circumference (cm)	101.5 ± 14.1	100.9 ± 14.5[ab]	99.8 ± 13.7	100.6 ± 14.2[e]
Dyslipidemia (% yes)	678 (75%)	1561 (56%)[ab]	1069 (59%)	33.08 (60%)[f]
Hypertension (% yes)	577 (63%)	1399 (50%)[ab]	970 (54%)	2946 (54%)[f]

Depressive symptoms [g, h]	4.8 ± 3.7	4.3 ± 3.5[b]	4.0 ± 3.4	4.3 ± 3.5[f]
Tobacco Use (% current) [h]	172 (19%)	501 (19%)[ab]	274 (15%)	947 (18%)[f]
Other Disease Severity Indicators				
Diabetes	223 (25%)	519 (19%)	329 (18 %)	1071 (20%)[f]
Heart Failure	32 (4%)	74 (3%)	49 (3%)	155 (3%)
CCS Class (% >1)	51 (7%)	84 (4%)	49 (3%)	184 (4%)[f]
Referral Event / Procedure				
ACS - MI	210 (23%)	1406 (51%)	922 (51%)	2538 (46%)[f]
PCI	174 (19%)	976 (35%) [ab]	758 (42%)	1908 (35%)[f]
CABG	239 (26%)	724 (26%)	462 (26%)	1425 (26%)
ACS - Unstable Angina	84 (9%)	220 (8%)	138 (8%)	442 (8%)
Stable CAD	210 (23%)	145 (5 %)	99 (6%)	454 (8%)[f]
Aortic Valve Procedure	28 (3%)	92 (3%)	76 (4%)	196 (4%)
Cardiac Medications				
Statins	745 (82%)	2271 (82%)[ab]	1648 (91%)	4664 (85%)[f]
Beta-blockers	701 (77%)	2100 (76%)[ab]	1466 (81%)	4267 (78%)[f]
ACE-inhibitors	547 (60%)	1693 (61%)[ab]	1191 (66%)	3431 (62%)[f]
ARBs	98 (11%)	240 (9%)[ab]	275 (15%)	613 (11%)[f]
Other				
Peak Metabolic equivalents of task	6.2 ± 2.9	7.2 ± 3.2[ab]	7.9 ± 3.5	7.3 ± 3.3[f]

QoL - PCS[i]	37.1 ± 9.9	37.4 ± 9.6	37.9 ± 9.9	37.6 ± 9.8
QoL- MCS[i]	48.9 ± 11.3	49.8 ± 10.7[b]	50.4 ± 10.5	49.9 ± 10.7[d]

[a]p<.001 for association with dose (total sessions).
[b]p<.001 association with exercise sessions.
[c]difference by patient status, assessed via chi-square or analysis of variance as applicable; [d] indicates p<0.05, [e] indicates p<0.01 and [f]indicates p<0.001 for total column.
CR, Cardiac Rehabilitation; SF-12 PCS, Physical component scores of quality of life questionnaire; CCS, Canadian Cardiovascular society; CAD, Coronary artery disease; ACS, Acute coronary syndrome; PCI, Percutaneous Coronary Intervention; CABG, Coronary artery bypass grafting; ACS, Acute Coronary Syndrome; MI, myocardial infarction; ARBs, Angiotensin receptor blockers; ACE-inhibitors, Angiotensin converting enzyme inhibitors; QoL, quality of life; PCS, Physical component score; MCS, Mental component score;
Note: n and percentage or mean and standard deviation shown.
[g]Hospital Anxiety and Depression Scale – depression subscale score; scores range from 0-21; scores >7 indicated "elevated" symptoms and higher scores denote greater depressive symptoms.
[h]other disease severity indicators / risk factor burden.
[i]Scores range from 0-100, with higher scores indicating higher QoL.

Table 2 – Intervening Clinical Events that Warrant Cardiac Rehabilitation Program Interruption in total cohort, N=5508

	Number of events (%)	Number of patients (%)
Acute Coronary Syndrome- Myocardial Infarction	466 (35%)	455 (35%)
Percutaneous Coronary Intervention	228 (17%)	222 (17%)
Coronary Artery Bypass Grafting	177 (13%)	172 (13%)
Acute Coronary Syndrome -Other	163 (12%)	163 (13%)
Transient Ischemic Attack / Mild Non-disabling Stroke	89 (7%)	88 (7%)
Other Non-Cardiac Events	88 (7%)	88 (7%)
Decompensated Heart Failure / Acute Exacerbation (unsafe to exercise)	52 (4%)	52 (4%)
Valve Procedures	20 (2%)	16 (1%)
Cardiomyopathy	14 (1%)	14 (1%)
Pulmonary Diseases	10 (1%)	10 (1%)
Cerebrovascular Accident	11 (1%)	11 (1%)
Peripheral Vascular Diseases	9 (1%)	9 (1%)
Other Cardiac (e.g., Arrhythmia, Ablation, Pacemaker, ICD)	1 (0%)	1 (0%)
Total	1328 (24%)	-

ICD: implantable cardioverter defibrillator.

Table 3 – Components attended (mean number of sessions), including by disease severity / risk factor burden

Components	Retained sample without intervening event	Disease Severity Indicators / Risk Factor Burden[a]				
	N=2784	Patients with HF (n=74)	Patients with Diabetes (n=519)	Patients with CCS Class >1 (n=84)	Tobacco Users (n=501)	Patients with Elevated Depressive Symptoms (n=527)
Supervised exercise sessions - group	20.49 ± 17.45 (21.0)	22.96 ± 16.58 (23.5)	20.73 ± 17.13 (20.0)	20.27 ± 17.04[c] (17.5)	15.76 ± 16.71[d] (9.0)	20.17 ± 16.65[d] (18.0)
Exercise counseling-individual	1.09 ± 0.73 (1.0)	1.12 ± 0.55 (1.0)	1.16 ± 0.65[b] (1.0)	1.24 ± 0.61 (1.0)	1.08 ± 0.78[c] (1.0)	1.19 ± 0.59[d] (1.0)
Exercise counseling-group	0.92 ± 1.11 (1.0)	0.92 ± 0.96 (1.0)	0.91 ± 1.09 (0.0)	0.87 ± 1.07[b] (1.0)	0.81 ± 1.14[d] (0.0)	0.91 ± 1.08[d] (1.0)
Dietary-individual	1.67 ± 1.48 (2.0)	1.88 ± 1.69 (2.0)	1.66 ± 1.40 (1.0)	1.77 ± 1.47 (2.0)	1.20 ± 1.24[d] (1.0)	1.78 ± 1.41[d] (2.0)
Dietary-group	0.50 ± 0.56 (0.0)	0.36 ± 0.51[b] (0.0)	0.39 ± 0.52[d] (0.0)	0.39 ± 0.49 (0.0)	0.56 ± 0.55[b] (1.0)	0.37 ± 0.52[d] (0.0)
Psychology sessions-individual	1.29 ± 5.94 (0.0)	1.11 ± 3.86 (0.0)	0.94 ± 3.37 (0.0)	2.50 ± 8.43 (0.0)	1.51 ± 7.24[c] (0.0)	3.12 ± 8.85[d] (0.0)
Stress management-group	0.23 ± 1.32 (0.0)	0.20 ± 1.09 (0.0)	0.18 ± 1.14 (0.0)	0.26 ± 1.42 (0.0)	0.20 ± 1.16 (0.0)	0.39 ± 1.69[b] (0.0)
Tobacco cessation[e]	0.28 ± 1.63 (0.0)	0.09 ± 0.29 (0.0)	0.29 ± 2.14[b] (0.0)	0.63 ± 3.24 (0.0)	1.12 ± 3.66 (0.0)	0.36 ± 2.18[c] (0.0)
Total sessions (dose)	26.49 ± 21.30 (27.0)	28.97 ± 19.54 (32.0)	26.25 ± 19.86 (27.0)	28.11 ± 22.05[b] (25.0)	22.22 ± 21.76[d] (13.0)	28.31 ± 21.79[c] (27.0)

[a]significant difference in total dose whether patient has disease severity indicator / risk factor or not
[b] indicates $p<0.05$; [c] indicates $p<0.1$; [d] indicates $p<0.001$;

[e]among tobacco users only
Acronyms: CCS, Canadian Cardiovascular Society; HF, Heart failure;
Note: mean and standard deviation of number of sessions attended per program displayed (median).