Background and Aims: We plan to test predictive accuracy of RCIs against clinically important outcomes in cardiac rehabilitation. We propose an innovative application of Reliable Change Indices (RCIs), a statistical method from Psychology, to measure true clinical change of individuals in cardiac rehabilitation (CR). Established research methods can determine whether group means differ or change significantly, for example in randomized trials; yet reveal little about individuals. It remains crucial to determine whether any individual patient has changed meaningfully. RCIs can account for non-treatment variance in change scores, including measurement error and test exposure; and may therefore improve reliability and predictive accuracy. Following Chelune, RCI = \( \frac{x_2 - M_1}{SD_1} \), where \( x_1 \) and \( x_2 \) are an individual's test scores, \( M_1 \) and \( M_2 \) are the test means, pre- and post-treatment respectively; \( SD_1 \) is test-retest reliability or stability. RCIs are standard scores, can be used in statistical analyses or as criteria of individual change. For example, RCI \( \geq 1.96 \) is required to show (p = .05, 1-tailed) that an individual has improved. Our objectives were to develop stability estimates for the Hospital Anxiety & Depression Scale anxiety (HADS-A) and depression (HADS-D) subscales, the SF-12 Health Survey physical (PCS) and mental (MCS) composite scores, and to illustrate one potential RCI application.

Methods and Materials: We administered the HADS and SF-12 twice with a 1-week interval to each of 103 patients in the middle 2 months of their 6-month CR program. We chose this timeframe to minimize treatment-related change and acute emotional reactions due to referral events or impending CR discharge.

Results: With 80 patients completing (mean age = 64.9y; 20 women), test-retest reliabilities were: HADS-D, \( r_{12} = 0.874 \); HADS-A, \( r_{12} = 0.901 \); PCS, \( r_{12} = 0.831 \); MCS, \( r_{12} = 0.781 \); all p < 0.001. HADS-A changed significantly, from \( M_1 = 5.74 \) (SD = 3.75) to \( M_2 = 5.01 \) (SD = 3.60) p < 0.001, consistent with test exposure. HADS-D (\( M_1 = 3.36 \); SD = 5.11; \( M_2 = 2.21 \); SD = 5.15; p = 0.463), PCS (\( M_1 = 44.78 \); SD = 10.54; \( M_2 = 44.85 \); SD = 9.39; p = 0.913), and MCS (\( M_1 = 51.32 \); SD = 9.78; \( M_2 = 52.09 \); SD = 10.15; p = 0.50) remained similar over time.

Conclusions: All psychometric subscales showed high stabilities, which are therefore good bases for RCIs. For illustration, the HADS-D of an anonymous individual from our program decreased by 1.03 from the Ontario CR Pilot Project were assigned to an Anonymized individual, then RCI(\( x_2 - x_1 \) = 0.57); we would be unable to say that this individual's score had decreased reliably. We plan to test predictive accuracy of RCIs against clinically important outcomes in future research.

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calculated by dividing heart rate by walking speed attained in the last full one-minute interval of ISWT and multiplied by 10 to describe heart-beats per 15m walked.

**Results:** Walking distance for T1, T2 and T3 with corresponding heart rates and HRWSI are summarized in table 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>T1 (Practice test)</th>
<th>T2 (after T1)</th>
<th>T3 (after #2CR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance walked (m) (SD)</td>
<td>278.5 (95.1)</td>
<td>346 ± 122.7</td>
<td>425.7 ± 122.7</td>
</tr>
<tr>
<td>Percent change from T1</td>
<td>17%</td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>Heart rate (group mean)</td>
<td>96</td>
<td>99</td>
<td>102</td>
</tr>
<tr>
<td>HRWSI, beats per min for each 10m walked</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With no exercise training, after one week, participants increased walking distance by 17%. There was a corresponding 12% reduction in the HRWSI from 3.2 to 2.8. After 8-weeks CR there was a 42% improvement in walking distance from T1. At best the true physiological change, based on the HRWSI, would be 14% (T2 – T3). The remaining 28% explained by familiarization/walking economy and/or motivation.

**Conclusions:** The use of a HRWSI provides for a true outcome of aerobic fitness, compared with just reporting distance walked; even when a practice test is performed. The HRWSI provides clarity on changes due either to physiological, psychological or motor learning mechanisms. A simple nomogram table to quickly calculate HRWSI has been produced. The HRWSI can also be used to help patients understand CR benefits; in this case the average patient decreased his/her HRWSI by 0.4 for each 10 m walked, thus they can be informed for 100m or every mile walked they now save 4 and 64 heart-beats, respectively.

**Oral #4**

**DEGREE AND CORRELATES OF HEART FAILURE CLINIC USE**

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**Background and Aims:** Heart failure (HF) has become a major burden worldwide as it is associated with high prevalence, incidence and mortality rates, frequent hospital readmissions and high health care costs. HF clinic visits have been shown to reduce readmission rates by 25%-50%, and have favourable effects on quality of life, survival and cost of care. The objective of this study was to: (1) describe the rates of HF clinic referral and attendance, and (2) examine the factors related to HF clinic use based on the Anderson’s Behavioral Model of Healthcare Utilization.

**Methods and Materials:** This study represents a secondary analysis of a larger prospective cohort study on access to cardiac rehabilitation. At baseline, participants were asked whether they had attended a HF clinic, and if so, the number of times they had attended. Results: Of the 273 participants, 41 (15.0%) were referred and 38 (13.5%) attended a HF clinic at one of 16 sites. In an adjusted logistic regression analysis, factors significantly related to program use were: referral to other outpatient disease management programs (OR = 8.56, p = 0.03), seeing a heart specialist more frequently (OR = 4.76, p = 0.04), higher education (OR = 3.66, p = 0.04), and lower perceived stress (OR = 1.08, p = 0.03). There was a trend towards the absence of exertional dyspnea increasing the likelihood of clinic attendance (p = 0.05).

**Conclusions:** Only one-seventh of HF patients were referred and attended a HF clinic. The results of this study suggest that the few patients who are accessing HF clinics are repeated users of healthcare services, potentially due to their greater health literacy. Given the benefits of HF clinics, more research regarding how we can coordinate outpatient disease management program care and optimize utilization is needed.

**Oral #5**

**RISK ASSESSMENT IN ACS PATIENTS WITH EARLY DISCHARGE AND ACCESS TO REHABILITATION (Radar) Pilot Project**

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**Background and Aims:** Increased hospital length of stay (LOS) impacts patient throughput during the acute care journey and increases health care costs. The LOS for cardiology patients (pts) with Acute Coronary Syndrome (ACS) varies from 3-7 days. Patient participation in CR is a cost effective intervention that results in a reduction in cardiac mortality, and may reduce costs to the health care system. The goal of the RADAR pilot was to ensure early facilitated access to CR while simultaneously reducing LOS for low and moderate risk ACS pts.

**Methods and Materials:** Cardiologists and CCU nurses performed the GRACE (Global Registry of Acute Coronary Events) risk score on 223 admitted ACS pts (75% men). The GRACE risk score is a valid well calculated risk assessment tool that identifies ACS pts as meeting low, moderate or high risk criteria for in-hospital death. ACS pts were sub-classified as STEMI, NSTEMI and Unstable Angina. Pts scored as low and moderate risk were targeted for discharge on the 5th day after admission. Reasons for failure to discharge on pts on the target date were recorded. In an adjusted logistic regression analysis, factors significantly related to discharge on the 5th day after admission were: PTCA, PCI, angina, arrhythmia, catheterization, coronary heart failure. The goal of the RADAR pilot was to ensure early facilitated access to CR while simultaneously reducing LOS for low and moderate risk ACS pts.

**Results:** Of the 273 patients, 71 (26%) were referred to CR whereas PCI, angina, arrhythmia, catheterization, coronary heart failure, and 25% for females. Younger patients were more likely to be referred. Acceptance of a CR referral appointment with a CR nurse or an exercise tolerance test (if appropriate) at the participating CR program for < 10 days. Reasons for exclusion were a high GRACE risk score, need for cardiac surgery or referral or inability to attend the participating CR program.

**Conclusions:** There was a significant decrease in the wait time to attend CR as well as reduced LOS in the RADAR participant group. These results suggest that identifying low and moderate risk ACS pts, as well as an automatic referral to CR decreases the wait time to attend CR. Using the GRACE risk score to identify low and moderate risk ACS patients contributes to reduced LOS by increasing physician awareness of risk stratification and facilitation of meeting discharge target dates. System efficiency can be improved by including CR as an extension of acute care, thereby enhancing the continuum of patient care and the overall patient journey.
Previous studies have reported that patients who participate in home-based cardiac rehabilitation (CR) programs achieve at least similar improvements in exercise performance (EP) compared to those participating in centre-based CR. These results have been obtained from controlled trials where patients were randomized to either centre- or home-based exercise. In our own CR program we have observed that a sizable minority of patients begin centre-based CR and then, following engagement with the CR staff, make a joint decision to transition to a home-based program. It is unknown whether these “transition” patients achieve similar outcomes to those who continue in the centre-based program. The aim of this investigation was to explore whether transition patients achieve similar changes in EP compared to centre-based patients.

Methods and Materials: Beginning in 2008, transition patients were systematically identified in the electronic patient management system of our CR program. Data were extracted on 516 patients who had completed the standard six-month CR program between January 2008 and April 2010. Patients received a personalized exercise prescription of at least twice per week aerobic exercise sessions. Patients who completed the on-site supervised program (n = 250, 57 women) were considered “centre-based” and those who transitioned to a home-based program (n = 66, 10 women) after attending two or more centre-based exercise sessions were considered transition patients. The change in peak EP between intake and exit stress tests was examined. Peak EP was determined using standardized equations based on the peak treadmill grade and speed. A paired t-test was conducted to determine the mean level of improvement reached overall, and a t-test determined which group experienced greater improvements in EP. Results were considered significant at the 5% critical alpha level (p < 0.05).

Results: Overall, patients’ EP increased significantly by 1.92 ± 1.85 METs during CR (p < 0.0001). Those who completed the centre-based program increased their EP by a mean of 1.95 ± 1.83 METs. This improvement was not significantly different than the mean increase experienced by transition patients of 1.79 ± 1.87 METs (p = 0.517). The results did not change significantly following adjustment for the potential confounders of age, sex and distance traveled to the CR centre.

Conclusions: Centre-based and transition CR programming both resulted in significant improvements in EP for participants and the average amount of improvement did not differ significantly between the two groups. Although confounding study is needed, these preliminary data may have important implications for decisions regarding future resource allocation.

Oral #9

EFFECTS OF NORDIC POLE WALKING ON FUNCTIONAL STATUS IN PATIENTS WITH MODERATE TO SEVERE HEART FAILURE: A RANDOMIZED CONTROLLED TRIAL

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Background and Aims: Patients with heart failure are a growing population within cardiac rehabilitation programs. Usual care for these patients consists of low to moderate intensity aerobic exercise, typically walking, and upper body strength training exercise. Here we report results from the Nordic Walking Study examining the effects of 12 weeks of walking with Nordic poles versus usual cardiac rehabilitation care on functional status, VO2 peak, physical activity, body weight, waist circumference, anxiety and depressive symptoms in patients with moderate to severe heart failure.

Methods and Materials: Between 2008 and 2009, we conducted a randomized controlled trial at the University of Ottawa Heart Institute where 54 patients (44 men; 10 women; mean age = 62.4 ± 11.4 years) with moderate to severe heart failure (mean ejection fraction = 26.9 ± 0.6%) were randomly assigned to usual care (n = 28) or Nordic pole walking (n = 26) for 12 weeks. Our primary outcome was functional status assessed by distance traveled in the 6-minute walk test at 12 weeks.

Results: The follow-up assessment rate for our primary end point of functional status was 76%. Analysis of covariance indicated Nordic pole walking improved functional status (62.1 ± 130 vs. 548 ± 150 meters traveled in 6 minutes, P = 0.026) and waist circumference (95.4 ± 35.1 vs. 99.5 ± 9 cm, P = 0.051) at 12 weeks compared to usual care. There were no significant differences between groups after 12 weeks for VO2 peak (24.4 ± 7.7 vs. 22.2 ± 7.2 ml/kg/min, P = 0.167), physical activity (264 ± 103 vs. 284 ± 104 minutes per week, P = 0.567), body weight (81.4 ± 18.7 vs. 85.0 ± 12 kg, P = 0.525), anxiety (51.2 ± 31 vs. 4.4 ± 34.3 years, P = 0.039) or depressive symptoms (15.5 ± 2.5 vs. 3.2 ± 2.9, P = 0.040).

Conclusions: Improvement in functional status was 14% greater in patients with moderate to severe heart failure assigned to Nordic pole walking versus usual cardiac rehabilitation care. These results need to be replicated in other studies; however, this is a promising exercise modality for this patient population.
BACKGROUND: Socioeconomic status is consistently among the most fundamental determinants of health status and knowledge about health and disease. Much of this relationship can be attributed to the combined effects of disparities in health-related behaviours, environmental conditions, social structures, and the contact and delivery of health care. Because these factors change in developed and developing countries and because they are modifiable, it is important to find ways to reach people with different lifestyles. The purpose of this study was to compare knowledge of coronary patients in cardiac rehabilitation programs in Brazil and Canada, using the CADE-Q (Coronary Artery Disease Educational Questionnaire).

Methods: The sample consisted of 300 coronary patients participating in a cardiac rehabilitation program in Brazil, mean age 65.72 ± 10 years (min = 36, max = 86), 227 men and 300 coronary patients participating in a cardiac rehabilitation program in Canada, mean age 64.02 ± 9.87 years (min = 40, max = 88), 236 men. All patients were characterized in terms of age, gender, risk factors, comorbidities or associated diseases, duration in cardiac rehabilitation, specific treatments, and educational level by a questionnaire to characterize the individuals. Knowledge was assessed using the CADE-Q, validated in both languages and analyzed by means of general knowledge (total scores, max = 57), knowledge of questions (alternatives marked), specific knowledge (scores of each area of knowledge) and knowledge of groups (population characteristics). Both study instruments were applied in the presence of the researcher and with the consent of patients. The data were processed through descriptive statistics, Proportion and Student t-test.

Results: Canadians have a statistically better knowledge than the Brazilians. These significant differences occurred in the general knowledge (45.40 ± 5.64; 39.34 ± 7.51, p < 0.001), in the number of complete knowledge alternatives marked (13.47 ± 3.49; 11.86 ± 3.48, p = 0.05), in the specific knowledge of three areas of the questionnaire (area 2, 3 and 4, p < 0.001) and in 13 of 19 questions of the CADE-Q. About knowledge of groups, patients that are Canadian, young (under 65 years old), male, with associated comorbidities, who had any cardiac surgery, with occupations in the health area or superior level, with university or postgraduate educational level, with a family income of over C$50,000 per year or more than 15 Brazilian minimum salaries per month appear to have a significantly knowledge about coronary artery disease.

Conclusion: There is a difference in knowledge of coronary patients in cardiac rehabilitation programs in Brazil and Canada and this difference is related to factors such as socioeconomic status.
health professionals so that they may encourage patients to join a CR program. This research also provides a foundation for initiatives to further support and refine the acute care CR referral process.

Poster #4
SCREENING FOR OBSTRUCTIVE SLEEP APNEA IN PATIENTS IN PHASE II CARDIAC REHABILITATION: A PRELIMINARY STUDY
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Methods and Materials: 171 consecutive patients entering a cardiac rehabilitation program were screened. The BSQ and the ESS was administered simultaneously at the beginning of the programme. CR admissions were due to: coronary artery by-pass grafting (30%), coronary angioplasty/stent (30%), angina pectoris or myocardial infarction (20%), aortic/mitral valve replacement (10%), dilated cardiomyopathy (3%), other (11%).

Results: High risk for OSA was found in 66 patients (38%). 50 patients were detected at high risk of having OSA using only the BSQ, 5 patients were detected at high risk of having OSA using only the ESS, 9 patients were detected at high risk of having OSA using both Berlin Sleep Questionnaire (BSQ) and Epworth Sleepiness Scale (ESS). Screening was required in 24.1% of the patients.

Conclusions: In this preliminary study, screening using Berlin questionnaire and Epworth Scale identify a high prevalence of patients at high risk of having sleep apnea. Screening must be encouraged in cardiac rehabilitation programme. Further investigations are nevertheless required to improve the strategy of screening with procedures that could be complex ( overnight oximetry, apnea link, polysomnography).

Poster #5
EFFECT OF THE WII SPORT BOXING VIDEO GAME ON HEART RATE IN CARDIAC PATIENT
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Methods and Materials: 280 voluntary patients (5 women, 22 men, mean age 50.6 ± 17.6 years old) were included in the study after completion of a 6 week cardiac rehabilitation (CR) program. Causes of admission in CR were: percutaneous transluminal angioplasty (30%), coronary angioplasty/stent (30%), angor pectoris or myocardial infarction (20%), aortic/mitral valve replacement (7%), dilated cardiomyopathy (5%), other (13%).

Results: The average age was 61.68 (SD = 9.6), they went to school for approximately 13.25 years (SD = 3.29), their BMI was 25.50 (SD = 5.8), and the majority were male (75%), married (77%), white (96%), and employed (37%). The percentage of patients meeting the PA guideline was 85% for self-report (i.e. ≥ 150 minutes of PA per week) and 77% for the pedometer (i.e. ≥ 5500 steps per day). Logistic regression showed that patients more likely to meet the guideline (i.e. ≥ 150 minutes per week) if they were married vs. other (odds ratio = 2.8) and if they were in the summer / fall vs. winter / spring (odds ratio = 2.12) seasons for the self-report data. For the pedometer data, results showed that younger (odds ratio = 9.5), more educated (odds ratio = 1.12), married vs. other (odds ratio = 2.42), summer / fall vs. winter / spring (odds ratio = 2.06), and lower BMI (odds ratio = 0.2) patients were more likely to meet the PA guideline (i.e. ≥ 5500 steps per day).

Conclusion: When examining PA during CR, it appears that patients are over-reporting the amount of PA they do when using a self-report PA measure. Furthermore, the relationships between subjective and objective PA measures and demographics / clinical correlates also vary emphasizing the importance of choosing the best measure to identify appropriate target groups warranting a PA intervention.

Poster #6
THE IMPORTANCE OF PHYSICAL ACTIVITY MEASUREMENT IN CARDIAC REHABILITATION
CM Blanchard, S Parks, K Lightbfoot, N Giacomantonio
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Background and rationale: Research examining physical activity (PA) patterns in patients attending cardiac rehabilitation (CR) programs are often based on self-reported data. Given that pedometers have become cheaper and better validated in recent years, it is important to delineate how much the choice of PA measure may influence the outcomes of a PA trial. Therefore, the present study determined whether self-reported PA and pedometer-based PA had (a) similar percentages of patients meeting PA guidelines, and (b) similar demographic / clinical correlates during CR.

Procedure: Patients completed a demographics / clinical survey during the 7th week of CR and a self-reported PA survey during the 22nd last week of three program, after which they were fitted with a pedometer (Yamax Digi-Walker). They were asked to wear the pedometer from the time they woke up until the time they went to bed for 7 days and were given a PA log to record their daily steps. They returned the pedometer, PA log, and survey the following week.

Results: The average age was 61.68 (SD = 9.6), they went to school for approximately 13.25 years (SD = 3.29), their BMI was 25.50 (SD = 5.8), and the majority were male (75%), married (77%), white (96%), and employed (37%). The percentage of patients meeting the PA guideline was 85% for self-report (i.e. ≥ 150 minutes of PA per week) and 77% for the pedometer (i.e. ≥ 5500 steps per day). Logistic regression showed that patients more likely to meet the guideline (i.e. ≥ 150 minutes per week) if they were married vs. other (odds ratio = 2.8) and if they were in the summer / fall vs. winter / spring (odds ratio = 2.12) seasons for the self-report data. For the pedometer data, results showed that younger (odds ratio = 9.5), more educated (odds ratio = 1.12), married vs. other (odds ratio = 2.42), summer / fall vs. winter / spring (odds ratio = 2.06), and lower BMI (odds ratio = 0.2) patients were more likely to meet the PA guideline (i.e. ≥ 5500 steps per day).

Conclusion: When examining PA during CR, it appears that patients are over-reporting the amount of PA they do when using a self-report PA measure. Furthermore, the relationships between subjective and objective PA measures and demographics / clinical correlates also vary emphasizing the importance of choosing the best measure to identify appropriate target groups warranting a PA intervention.

Poster #7
COMMUNITY SOCIOECONOMIC STATUS, URBAN SPRAWL, AND THE PERCEIVED ENVIRONMENT’S RELATIONSHIP TO PHYSICAL ACTIVITY DURING HOME-BASED CARDIAC REHABILITATION
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Background and rationale: Research explaining why patients with heart disease engage in moderate to vigorous physical activity (MVPA) has relied on intrapersonal (e.g., self-efficacy) and interpersonal (e.g., social support from family) correlates and has ignored the potential importance of broader environmental correlates. The present study examined the association between MVPA and urban vs. rural residential status, community socioeconomic status (SES), and the perceived environment in patients attending a home-based cardiac rehabilitation (CR) program.

Procedure: Patients completed a questionnaire assessing demographic and clinical characteristics, MVPA, and the perceived environment (i.e., the availability of home MVPA equipment, access to facilities, and neighborhood characteristics) measured at the beginning and end of a 3-month home-based CR program. Patient addresses were geocoded and linked to the 2006 Canadian census to establish the urban / rural distinction and community SES.

Results: 280 patients were recruited that were primarily male (77%), had greater than a grade 12 education (63%), and an average age of 42.6. Multi-level modeling analyses showed that urban and rural patients had similar baseline MVPA and improvements in MVPA by 5 months. However, higher community SES was significantly related to baseline MVPA levels for urban (beta = 1.24, p = .01) and rural (beta = 5.26, p < .001) patients, although it was not related to the change in MVPA. For urban patients, owning an outdoor bike, having access to walking paths and interesting things to look at in their communities was significantly related to increased MVPA. For rural patients, owning an indoor stationary bike and living in a community that had access to many shops and markets, interesting things to look at, and where they saw other people exercising was significantly related to increased MVPA. None of these relationships were moderated by community SES.

Conclusion: Although there does not appear to be an urban advantage in MVPA over rural patients, the perceived environmental correlates of MVPA do vary for urban and rural patients during home-based CR and should be considered in future MVPA behavioral interventions.

Poster #9
THE ROLE OF SOCIAL COGNITIVE VARIABLES DURING HOSPITALIZATION IN PREDICTING FUTURE ATTENDANCE IN CARDIAC REHABILITATION PROGRAMS
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Background and Aims: Despite the numerous benefits associated with cardiac rehabilitation (CR), uptake to these programs ranges from 15% to 20%. Although various clinical, demographic, and physician referral patterns have been used to explain this, very little research has utilized a theoretical approach to do so. Therefore, the present study used Social Cognitive Theory (SCT) to determine if theoretical differences were apparent in hospital between patients who attend versus those who do not attend CR.

Methods and Materials: Patients were recruited in the hospital and asked to complete a survey that included SCT variables (i.e., barrier and task self-efficacy, outcome expectations, social support, anxiety, depression, and modeling). They were then tracked to determine if they entered CR or not over a 4-year period.

Results: 435 patients, with a mean age of 62 years, were recruited. Of these, 172 (39.7%) went to CR. Significant differences were found such that patients who did not attend CR had more confidence that they could overcome barriers to physical activity (No CR: 60.76; CR: 55.0% p < 0.05), they had stronger beliefs that they would receive health benefits from engaging in physical activity (No CR: 6.20; CR: 6.08, p < 0.05), and they were more influenced by seeing others close to them engaging in physical activity (No CR: 5.48; CR: 5.09, p < 0.01). These differences were not present in the patients who did attend CR. There were no between-group differences in patients’ confidence to do physical activity (i.e., task self-efficacy), social support from family and friends, or in patients’ anxiety or depression levels.

Conclusions: These findings suggest that theoretical variables (i.e., barrier self-efficacy, outcome expectations, and modeling) measured in hospital may need to be considered in conjunction to other known predictors of CR uptake when designing interventions to increase uptake.

Poster #10
THE IMPACT OF PRE-MORBID AND POST-MORBID DEPRESSION ON MORTALITY AND MORBIDITY AMONG CORONARY ARTERY DISEASE PATIENTS: A META-ANALYSIS
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Rationale: Depression is common and persistent, with a burden of about 20% among coronary artery disease (CAD) patients. Depression has also been shown to increase cardiac morbidity and mortality in CAD patients. Given this burden, the CACR Guidelines and an AASVPR Position Statement (JCRP, 2005) both endorse identification and referral or treatment of depression in cardiac rehabilitation (CR). Indeed, CR can have ameliorating effects on depression, but paradoxically depression is also one of the major barriers to CR use. Recent evidence suggests that patients with new-onset depression post-CAD diagnosis have worse outcomes than those who had previous or recurrent depression. Understanding which depression timeframes are more prognostic is important in screening and treatment decisions for physicians and CR providers.

Objectives: This meta-analysis investigated timing of depression onset in CAD and CAD-free cohorts to determine what timeframe is associated with greater mortality and morbidity.

Methods: The MEDLINE, EMBASE, and PsychINFO databases were searched systematically to identify articles examining timeframes of depressive episodes or symptoms which were included in CACR-patients examined new-onset depression in comparison to previous or recurrent depression. The pooled effect size (risk ratio) was 0.76 (95% CI 0.64-0.9) for history of depression only, 1.0 (95% CI 1.0-2.0) for pre-morbid depression onset, 2.11 (95% CI 1.66-2.60) for post-morbid or new depression onset, and 1.59 (95% CI 1.08-2.4) for recurrent depression. The results suggest that new-onset depression especially in hospital may be more predictive of mortality and morbidity than recurrent or pre-morbid depression. However, sensitivity analysis revealed that this finding was subject to the quality of the studies reviewed.

Conclusions: Both pre-morbid and post-morbid depression onset is hazardous to CAD clients. The findings also suggest that historical depression may have a protective effect on survival. This might indicate a retention bias in cohort studies. Depression in CAD outpatients is related to 2-times greater mortality and morbidity, which underlines the importance of screening and treating patients within CR programs. An AHA Science Advisory (Circulation, 2000) recommends screening using the Patient Health Questionnaire, which is available at no charge and corresponds to the diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders (APA).

Poster #11
THE RELATIONSHIP BETWEEN BODY IMAGE AND PHYSICAL ACTIVITY IN PEOPLE ATTENDING CARDIAC REHABILITATION
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Background and Aims: Increased exercise capacity, as achieved through engaging in sufficient physical activity (PA), is one of the strongest predictors of longevity among people living with heart disease. Unfortunately, there appear to be barriers (e.g., low self-efficacy, poor attitudes and intentions with regards to exercise, depressive symptomology, etc.) to engaging in PA in this population. Another important potential barrier that may impede PA in people living with heart disease is body image. While research in non-clinical populations has shown that people with poor body image tend to engage in less PA than those with a healthy body image, there has been a dearth of research on body image and PA in cardiac patients. The purpose of this study is to determine the relationship between body image and PA over time in people attending CR.

Methods: This longitudinal pilot study consisted of a sample of 34 participants (mean age of 63.74 years, 61.5% male, 96.7% Caucasian), recruited at the beginning of a hospital-based CR program (T1), and followed up three months later at the end of CR (T2). Informed consent was obtained, demographic information was collected, and participants completed self-report questionnaires assessing body image (McKinley and Hyde’s Objective Body Consciousness Scale, 1996) and PA (Godin’s Leisure Time Exercise Questionnaire, 1985) at both time points. Pearson correlations were calculated using SPSS version 15.0 to determine the relationship between each of the three body image subscales (body surveillance, body shame, and control beliefs) and PA at each time point.

Results: A significant inverse relationship (r = −0.7, p = 0.04) was found between total minutes of moderate intensity PA at T1, and body shame at T2, that is, those with fewer minutes of...
moderate PA at T2 tended to report higher body shape at T2. Significant inverse relationships were also found between the number of days of vigorous intensity PA and body surveillance at T2 (β = -0.40, p = .027), and days of vigorous PA and body shape at T2 (β = -0.45, p = .003).

Conclusion: It appears that there is a relationship between body image and PA in hearts patients attending CR, with lower minutes of moderate intensity PA at the beginning of CR predicting higher body shape upon completion. In addition, both high body surveillance and high body shape at the end of CR were associated with fewer days of vigorous PA at this time point.

Poster #12
ADHERENCE TO A CARDIAC REHABILITATION HOME PROGRAM MODEL OF CARE—A COMPARISON TO A TRADITIONAL PROGRAM

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Rationale: Cardiac Rehabilitation (CR) is recommended for patients living with heart disease. The benefits of CR have been well documented showing an improvement in functional capacity and quality of life and lower mortality rates. Despite these benefits, CR continues to be underutilized and adherence to programs is sub-optimal. Eighty percent of eligible patients are not participating in the service and of those who do participate, 40-50% drop out prematurely. Alternative models of care like the Home Program (HP) have been proven to provide similar outcomes to traditional on-site programs (TP) and have been suggested to help combat this adherence problem. Despite the established effectiveness of the HP, its effect on adherence and the factors that affect adherence have been only briefly examined.

Method: A retrospective review of 200 consecutively enrolled patients who chose either a TP or HP model was undertaken. Profiles and characteristics were based on information collected at the time of their intake assessment. Anthropometric and exercise clinical outcome data were based on initial and 6-month assessments and adherence data by attendance records and overall compliance determined at discharge.

Results: No significant difference was seen between the home and traditional programs for adherence to pre-scheduled contacts (p = 0.21). The same completion rate was seen when compared between programs (p = 0.22). HP patients were younger (p = 0.03), had more males (p = 0.02), lived farther from the centre (p = 0.02), had more workers (p = 0.007) and had a higher peak VO2 (p = 0.001) than patients in the TP. No differences were seen in the change of outcomes for functional capacity. HP and depression between programs when entry and 6-month assessments were compared. Weight (p < 0.001), waist measurement (p = 0.002) and percent body fat (p = 0.003) improved more in the HP.

Conclusion: Individuals who chose the HP model of care showed a different profile, showed different changes in body composition but had similar results for adherence and completion of CR when compared to the TP. Further research is needed to determine an optimal design for the HP model and to explore the reasons for drop-out from the HP.

Poster #13
IS SOCIAL INTEGRATION ASSOCIATED WITH EXERCISE INVOLVEMENT IN CORONARY HEART DISEASE PATIENTS?

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Background and goal: Exercise (EX) is a crucial component of prevention and recovery from Coronary Heart Disease (CHD). However, CHD patients generally fail to initiate or maintain exercise programs when entry and 6-month assessments were compared. Weight (p < 0.001), waist measurement (p = 0.002) and percent body fat (p = 0.003) improved more in the HP.

Conclusion: Individuals who chose the HP model of care showed a different profile, showed different changes in body composition but had similar results for adherence and completion of CR when compared to the TP. Further research is needed to determine an optimal design for the HP model and to explore the reasons for drop-out from the HP.

Poster #14
A PILOT STUDY OF THE RELATIONSHIP BETWEEN DOG OWNERSHIP AND PHYSICAL ACTIVITY DURING CARDIAC REHABILITATION

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Background and Aims: Research has consistently shown that participation in cardiac rehabilitation (CR) programs increases exercise capacity and reduces subsequent mortality for coronary heart disease (CHD) patients. Despite these promising findings, exercise adherence during and following CR programs remains suboptimal. It is therefore imperative that researchers identify determinants of exercise which may be targeted toward developing more effective exercise interventions. One determinant which has been ignored to date is dog ownership. This is an important oversight as research has generally found that dog ownership is associated with increased exercise. The purpose of this study was therefore to examine whether this relationship holds true in CHD patients attending CR.

Methods and Materials: 96 CHD patients (74% males; mean age: 61.80 (SD = 9.40); BMI 25.35 (SD = 6.10) attending CR programs in the Halifax region participated in the current study. During the 3rd week of a 12 week CR program, participants were asked to complete a questionnaire which contained a self-report measure of physical activity (The Godin Time-Leisure Exercise Questionnaire), demographic information, and information related to dog ownership. During the last week of their CR program participants completed the same questionnaire and also wore a pedometer for one week's time to provide an objective measure of physical activity.

Results: Of the 96 participants, 21 (22%) reported owning a dog. Dog ownership was not related to baseline age, years of education, gender, BMI, or self-reported physical activity. Furthermore, dog ownership was not associated with self-reported physical activity at the end of CR. However, dog owners took significantly more steps per day (M = 9429.05 (SD = 9745.44)) than non owners (M = 7206.14 (SD = 2088.77); F(1,94) = 4.59, p < .05). Using hierarchical regression analyses, dog ownership was still a significant predictor (accounting for roughly 4% of the total variance) of steps per day after controlling for age, education, gender, BMI, and baseline physical activity.

Conclusions: Dog ownership was not related to self-reported physical activity at baseline or at the end of CR. However, based on objective measures collected through pedometer recordings, dog ownership was found to be a significant predictor of physical activity, even after controlling for other potentially relevant variables. Dog ownership shows promise as a determinant of PA which may be targeted during CR. More research is needed to determine the nature and extent of this relationship.

Poster #15
RELIABLE CHANGE INDICES TO ASSESS PROGRESS OF INDIVIDUAL CARDIAC REHABILITATION PATIENTS. II. STRESS TESTING: EXERCISE CAPACITY.

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Background & objectives: This project concerns an innovative application of Reliable Change Indices (RCI), a statistical method from Psychology, to measure true clinical change of individuals in cardiac rehabilitation (CR). A mean increment of 1 metabolic equivalent (MET) from exercise training has been associated with significantly fewer clinical events in subjects with coronary artery disease. 1 MET might therefore be used as a benchmark of change. Alternatively, 7 METS is sometimes taken as a threshold of functional limitation. Clearly, interpretation of individual change scores may vary considerably depending on change criteria. RCIs may improve reliability and predictive accuracy, as they account for nonretest variance in change scores, including measurement error and test practice. Following Chelune, RCI = $R_{X\rightarrow Xk}\times R_{Xk}\times M_1(M_2/S(D2))$, $x_k$ and $x_1$ are an individual’s test scores, $M_1$ and $M_2$ are the mean tests, pre- and post-treatment respectively, $x_k$ is test-retest reliability (stability). RCIs can be used in statistical analyses, or as individual change criteria. For example, $R_{X\rightarrow Xk}$ is required to show (p < 0.05, 1-tailed) that an individual has improved. Our objectives were to develop stability estimates for stress test treadmill time (TD) and indirectly determined peak METS, and to illustrate one potential RCI application.
HEART DISEASE

Poster #26

WOMEN'S CARDIAC REHABILITATION PROGRAM MODEL PREFERENCES: A PILOT STUDY

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Background: Heart disease is the leading cause of morbidity and mortality in women in Canada. Although cardiac rehabilitation (CR) is effective in improving prognosis for heart patients, women are less likely to adhere to these programs than men. Innovative models of CR care have been developed which may better meet women’s needs. Indeed, patient preference is an important factor influencing CR attendance. The objective of this study was to investigate women’s preference for hospital-based co-ed, women-only or home-based CR following participation in either hospital-based co-ed or home-based CR, as well as their degree of program participation and satisfaction.

Methods: Within this cross-sectional component of a pilot quasi-experimental study, consenting female cardiac inpatients (age=64±10.4) recruited from 1 of 2 hospitals were presented with the option to choose a hospital-based or home-based CR program. Participants were asked to rate their preference for these programs on a 5-point Likert scale.

Results: 15 (50%) participants enrolled in the co-ed hospital-based program, 11 (42.9%) did not enroll in any program, and 2 (7.7%) attended the home-based program following referral. Overall, 15 (50%) participants preferred the co-ed hospital-based program, 9 (30.3%) preferred co-ed hospital-based program, and 1 (3.3%) preferred a women-only hospital-based CR program. Model preference was significantly related to model attended, with co-ed hospital-based participants preferring the co-ed program model to which they were allocated (60%), and the home-based participants preferring the home-based program model (66.7%). Program satisfaction did not significantly differ by program model attended (mean = 3.4 ± 1.80). Percentage of prescribed exercise sessions attended did not differ between co-ed hospital-based attendees who preferred hospital-based co-ed CR (86% ± 8.9) versus co-ed attendees who preferred women-only or home-based CR (65% ± 3.5; p > 0.05).

Conclusions: This is the first study to investigate women’s preferences for CR program delivery, despite much discussion of the issue in the literature. These preliminary results suggest that women are quite satisfied with the programs they attended, regardless of the model. Replication with a larger sample is warranted, in addition to investigating female patient model preferences before referral.

Poster #27

DEVELOPMENT AND PSYCHOMETRIC EVALUATION OF A THEORY OF PLANNED BEHAVIOUR PHYSICAL ACTIVITY QUESTIONNAIRE FOR INDIVIDUALS AT RISK FOR CORONARY HEART DISEASE

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Background and Aim: Physical activity is important for the prevention of coronary heart disease (CHD), a leading cause of death in Canada. Understanding the factors that influence physical activity patterns in individuals at risk for CHD is important. The theory of planned behavior (TPB) has been used to explain and predict physical activity. Currently there are few theoretically-based measures of beliefs and intentions regarding engaging in regular physical activity in individuals at risk for CHD. The purpose of this study was to develop an appropriate questionnaire and test its psychometric properties.

Methods: We recruited 42 subjects to take a second stress test 1 week after their usual CR intake stress test (both preceded CR programming), using a modified Bruce protocol with standardized instructions to patients and physicians. We chose this interval to minimize spontaneous recovery or deterioration.

Results: With 32 subjects completing (mean age = 58.8 ± 8.6; 6 women). Test-retest reliability of TT = 0.95 (p < 0.01), for peak METs = 0.98 (p < 0.01) for TT increased significantly (p = 0.001) by 37.4% from M1 = 15.8 ± 7.1 min (SD = 5.2) to M2 = 14.1 ± 13 min (SD = 5.0), consistent with practice. Peak METs increased non-significantly (p = 0.06) by 0.46 METs, from M1 = 9.0 (SD = 3.5) to M2 = 10.0 ± 16 METs (SD = 3.26). Rightward shift of the ROC curve was evidenced which is consistent with the finding of improved accuracy of RCIs against clinically important criteria in future research.

Conclusions: Rightward shift of the ROC curve was evidenced which is consistent with the finding of improved accuracy of RCIs against clinically important criteria in future research.

Poster #18

EXERCISE FOR WOMEN WITH HEART FAILURE: SYSTEMATIC REVIEW

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Purpose: Women with heart failure (HF) present a major challenge to the health care system. Women with HF tend to be older than age than their male counterparts and are more likely to be hypertensive, diabetic and have diabetic dysfunction. Studies suggest that women living with HF have a worse quality of life, more dyspnea, worse functional status and more depression but survive longer. The use of exercise as an intervention to improve functional status and symptoms of HF is recommended as a beneficial strategy to improve symptoms for those with HF.

Methods: An electronic search of MEDLINE, CINAHL, Psych Info and The Cochrane Library database was performed. The literature search included selecting online, full text journal articles in English of studies that examined the use of physical exercise and/or cardiac rehabilitation for women with heart failure published within the last ten years (1999-2009). Relevant journals and reference lists of selected articles were reviewed. Studies that excluded those with preserved systolic function, the elderly (over 65 years), and those studies that did not have adequate representation of women were excluded.

Results: Eleven studies were selected that examined the impact of exercise for 659 participants with HF. Nine of the studies examined exercise capacity using various methods of measurement. Four of the studies measured quality of life (QoL). Three of the studies measured adherence while two of the studies reported the impact of self-efficacy on exercise. Other outcomes reported included anxiety, depression, anger, hostility, fatigue and dyspnea. Where measured, most studies reported an improvement in exercise capacity. QoL and improved symptoms of HF, and improved adherence rates with self-efficacy. Variability in the type and length of the exercise programs, the measurements tools used and study designs was evident. Under-representation of women was apparent in five of the studies.

Conclusions: Research on the use of exercise in women with heart failure is limited. Further research of large randomized controlled trials using consistent measurement tools inclusive of women with preserved systolic HF and reduced EFHF would help to inform the health care community of how women with HF experience the impact of exercise. Practitioners collaborating with multi-disciplinary HF, diabetes and hypertension clinics can work to increase accessibility of exercise programs for women with heart failure. Improving accessibility to cardiac rehab programs can also be achieved through education of health care providers on the safety and benefit of exercise for women with HF.

Poster #19

MEASURING BARRIERS TO CARDIAC REHABILITATION USE: CONCEPTUAL OVERLAP AND UNIQUENESS IN THREE SCALES

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Background: Cardiac rehabilitation (CR) is a lifesaving yet understudied chronic disease management program. This study investigated the nature of barriers to use, by exploring conceptual overlap and uniqueness in three scales.

Methods: The current questionnaire was developed for use as part of a randomized control trial of a lifestyle intervention in individuals with a family history of CHD and ≥1 additional risk factor. The elicitation questionnaire was administered to a sub-sample of 16 participants, and was comprised of a series of nine open-ended questions related to behavioral, normative, and control beliefs and intentions regarding physical activity. The open-ended responses were coded and analyzed qualitatively. These responses from the open-ended questionnaires were used to develop the response options for the final version of the physical activity questionnaire. A psychometric evaluation of the questionnaire was conducted in a separate sample of 10 participants over a two week period. Correlations for each scale (behavioral beliefs, normative beliefs, control beliefs and intentions) were analyzed to assess reliability and Cronbach’s alpha was computed to test the internal consistency of the questionnaire.

Results: Qualitative analysis of the open-ended responses led to the development of a questionnaire with 18 items related to behavioral beliefs, 10 items related to normative beliefs, 9 items related to control beliefs and 6 items related to intentions. The correlation coefficients ranged from 0.407-0.893 for behavioral, 0.469-0.915 for normative, 0.108-0.826 for control and 0.175-0.797 for intentions. The internal consistency was good with Cronbach’s coefficient alpha of 0.940, 0.903, 0.947 and 0.923 for behavioral benefit, normative belief, control belief and intention, respectively.

Conclusions: The physical activity questionnaire based on the TBP was found to be a reliable measure of participants’ behavioral, normative and control beliefs and intentions towards engaging in regular physical activity and it is suitable for use in individuals who are at risk of developing CHD.
the component structure and criterion validity of the investigation-generated Cardiac Rehabilitation Barriers Scale (CRBS), with the Beliefs About Cardiac Rehabilitation (BACR) and Cardiac Rehabilitation Enrollment Obstacles (CREO) scales.

**Method:** 135 cardiac outpatients (45 (33.3%) female; age: 64.9 ± 10.5) from 2 hospitals enrolled in a larger study completed a mailed survey including the 3 scales outlined above. Regardless of CR referral or enrollment, participants were asked to rate their level of agree-

- **Results:** Maximum likelihood factor analysis with oblique rotation of the subscales in the 3 scales resulted in a 5-factor solution. Overall, the factors explained about 45.3% of the total variance. Factor loadings revealed that the CRBS, BACR scale, and CREO scale assessed both common and unique barriers. With regard to the latter, the CRBS uniquely assessed work/time conflicts, logistical factors, and comorbidities/functional status. With regard to criterion validity, non-enrollees reported significantly greater barriers compared to enrollees on the CRBS (r = .50, p < .05), but not on the CREO scale (p > .05) in addition, only the CRBS was negatively and significantly related to degree of CR participation (r = −.50, p < .01).

**Conclusion:** The results suggest that while each of these scales assesses common barriers to CR utilization, the CRBS uniquely assesses work/time conflicts, logistical factors, and comorbidities/functional status and it may have the best criterion validity. These scales have been developed for research purposes, and replication of this study would be useful to determine their clinical utility for identification and tackling barriers.

**Poster #20**

**DEVELOPMENT OF THE FRENCH VERSION OF THE CARDIAC REHABILITATION BARRIERS SCALE**

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**Background:** Despite the established benefits of cardiac rehabilitation (CR), it is alarm-

- **Results:** 1785 participants completed the CRBS in English and 32 in French. Previously-estimated subscales in the English version of the CRBS remained internally-consistent in the French version: perceived need health care factors (Cronbach’s α = .78), logistical factors (Cronbach’s α = .95), work/time conflicts (Cronbach’s α = .80), and comorbidities/functional status (Cronbach’s α = .91). Descriptive analysis showed that the most strongly-endorsement barriers reported by patients who completed the CRBS in English were the following: "I already exercise at home or in my community" (2.87 ± 1.42), "travel (2.21 ± 1.30), "distance (2.20 ± 1.41), "work responsibilities" (2.22 ± 1.28), and "severe weather" (2.21 ± 1.30) In the French version of the CRBS, the most strongly-

**Conclusion:** Overall, results provide preliminary support for the French translation of the CRBS. Future research should psychometrically-validate the French version of the CRBS through factor analysis. In addition, the CRBS should be translated and validated in South Asian languages. Given that French is the second official language and South Asians are the most at-risk cardiac population in Canada, (yet are least likely to be represented in CR programs), availability of the CRBS in French and South Asian languages should enable future investigation of cultural and health system differences in CR barriers.

**Poster #21**

**THE QUIT SMOKING PROGRAM (QSP) AT THE UNIVERSITY OF OTTAWA HEART INSTITUTE: DESIGN, PATIENT CHARACTERISTICS AND OUTCOMES.**


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**Background:** Quitting smoking is the most important step that a smoker can take for cardiovascular health. Best practice guidelines recommend the use of first-line smoking cessation medications, strategic advice and follow-up support. The Quit Smoking Program (QSP) at the University of Ottawa Heart Institute is a nurse-managed program that assists smokers to quit using these recommended interventions. Here we describe the QSP, characteristics of smokers using the program, and smoking cessation outcomes achieved.

**Method:** All smokers entering the program from December 2006 – 2009 were included in the analysis. Smokers attended an information session followed by individual appointments with a tobacco treatment nurse specialist at 2, 4, 8, 12, and 16 weeks relative to a target quit date. Questionnaires including demographics, medical and psychiatric histo-

**Results:** Participants (N = 187; mean age = 50.7±11.2 years; 47% male) smoked an average of 25.3±15.3 cigarettes per day. Mean age of first cigarette use was 19.4±7±17.1 years. Co-morbidities included hypertension/dyslipidemia (49.5%), respiratory (45.1%), cardiovascular (42.1%), depression (40.9%), gastrointestinal (35.8%), endocrine (22.4%), dermatology (25.9%), anxiety (23.1%), and cancer (14.0%). Smokers attributed a high level of importance to cessation at the baseline session (mean = 9.4±4.0 scale), however their confidence was lower (mean = 6.8±1.10 scale). First line medications used were nicotine replacement therapy (82.5%), bupropion (77.7%), varenicline (74.4%). On average, participants attended 3 out of 4 sessions. The biochemically confirmed quit rate at the end of the QSP is 18%.

**Conclusion:** The QSP serves primarily smokers with long smoking histories and high lev-

**Conclusion:** Overall, results provide preliminary support for the French translation of the CRBS. Future research should psychometrically-validate the French version of the CRBS through factor analysis. In addition, the CRBS should be translated and validated in South Asian languages. Given that French is the second official language and South Asians are the most at-risk cardiac population in Canada (yet are least likely to be represented in CR programs), availability of the CRBS in French and South Asian languages should enable future investigation of cultural and health system differences in CR barriers.