

Conference Highlights

Fats: Friend or Foe?

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A recent trend has emerged questioning the long term health effects of dietary fats. For 50 years, the messaging around different types of fat and health risk has been that saturated fat, a fatty acid without double bonds, increases our risk of cardiovascular disease. This association was first made by Ancel Keys in the 1950s with the 7 Countries Study¹. It was the first epidemiological, longitudinal study looking at the effect of lifestyle on cardiovascular disease outcomes over various population groups. The study postulated that dietary fat, specifically saturated fat, caused high total serum cholesterol levels and that high serum cholesterol levels were a predictor of cardiovascular disease.

This view has been adopted by various organizations including Health Canada, American Heart Association, and World Health Organization among others (Table 1). Recent research has emerged suggesting that this may be an over simplification, and that different types of saturated fatty acids effect blood cholesterol in different ways. For example, stearic acid, a fatty acid found in beef is known to lower LDL cholesterol levels^{2,3}.

Table 1. Current dietary guidelines for total and saturated fat.

Canadian Dietary Reference Intakes (DRI)	2010	20-35% of total calories	As low as possible
Dietary Guidelines for Americans (DGAC/USDA)	2010	20-35% of total calories	<10% of total calories
AHA/ACC Lifestyle Management Guideline	2013	none	<7% of total calories
European Food Safety Agency (EFSA)	2010	20-35% of total calories	As low as possible
World Health Organization (WHO)	2008	15-35% of total calories	<10% of total calories

It is well established that trans fatty acids are known to unfavourably elevate low-density lipoprotein (LDL) cholesterol and lower high-density lipoprotein (HDL) cholesterol⁴. Governments have regulated food manufacturers to reduce their use of modified fats in foods such as margarines and baked goods since 2006 to bring estimated intakes to 3.5 grams/day⁵. Some people would argue that Canada should “ban” trans fat alongside US action taken in 2013.

Dietary cholesterol is a sterol compound that was once linked to increased risk of cardiovascular disease, and 30 years later, nutrition experts are softening on the actual detrimental effects. Eggs are a significant source



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does suggest that for a person who is at high cardiovascular risk (ie has Type 2 diabetes), the risk of developing disease increases with egg consumption of more than one per day. In primary prevention, egg consumption has not correlated to an increased risk of cardiovascular events⁶.

Changes in both nutrition science and media messaging have evolved considerably over the past 20 years. Nutritional science is ever-shifting, almost dangerously so. Messages change faster than the tide, and every time media reports on a new study, there is room for confusion at the consumer level. This makes it even more critical that as healthcare providers we need to closely examine these messages before we expel the virtues of what, how much and when to eat for optimal health. A good example of this is the marketing frenzy around the availability of fat free foods that went along with the message around a low fat diet being healthy in the 90's. "Fat free" bagels, cereal, jelly beans appeared in labelling, even fat free cooking spray (made of vegetable oil) without any regard to food quality or quantity.

"Nutrititicism" is a term coined by Michael Pollan with the intended meaning that the individual nutrients in food determine its' health benefit⁷. This can be a problem in that we lose sight of whole foods being the best alternative. We need protein, but is it not better to eat eggs, beans, or chicken rather than whey protein powder as a substitute?

While it is not entirely clear what types of fatty acids serve our health the best, evidence still suggests that substituting unsaturated fat for saturated fat results in fewer cardiovascular events^{8,9}. As such, this includes oily fish, and plant fats such as those from nuts, avocado, olive and canola oil to name a few. Supporting these results are those from the OMNI heart study which showed that a diet higher in protein and fat (largely plant based and unsaturated) resulted in fewer events compared to a diet higher in carbohydrate and lower in fat¹⁰.

What we can take from this debate is the fact that chronic disease is never about one nutrient, or one risk factor. Clients/patients are individuals and each one needs to be assessed for their overall risk and suggestions made accordingly. Interestingly, their risk may have less to do with their intake of saturated fat than was believed in the past. It is a good time to review the 'science' of dietary fats that is certain.

It does seem that the message is actually much simpler than it has been made out to be. The more fresh whole foods, and the less processed, refined food we eat, the healthier we are. Start with some basic, practical tips for your clients (*Table 2*). As healthcare professionals, we need not to fall prey to trends, gimmicks, and one-off studies with poor design, but continue to question guidelines, and recommendations tweaking messaging almost daily to stay in touch with the public.

Table 2. Tips for Clients for Healthy Eating

- If you want them to count grams of anything - aim for 25-35 grams of **fibre** a day.
- Speak about FOOD, (not just nutrients) as much as possible i.e. grocery shopping, recipes
- Eat mindfully - eat when hungry, stop when satisfied
- Ask about obvious sources of saturated fatty acids, but explain healthy amounts of all food can fit including cheese, beef, and butter
- Include v` colour at each meal (broccoli, peppers, carrots, etc.)
- Beans, beans the musical fruit...at least twice a week
- Eat nuts daily
- Consider a "Mediterranean diet", but explain what that means
- Cook at home more often - plan ahead, make batches of food

References:

1. Keys A. et al. The seven countries study: 2,289 deaths in 15 years. *Prev Med.* 1984 Mar; 13(2):141-54.
2. Hunter JE, Zhang J, Kris-Etherton PM. Cardiovascular disease risk of dietary stearic acid compared with trans, other saturated, and unsaturated fatty acids: A systematic review. *Am J Clin Nutr.* 2010 Jan; 91(1): 46-63.
3. Grundy SM. Influence of stearic acid on cholesterol metabolism relative to other long-chain fatty acids. *Am J Clin Nutr.* 1994 Dec; 60(6 Suppl):986S-990S.
4. Lichtenstein AH, Ausman LM, Jalbert SM, Schaefer EJ. Effects of different forms of dietary hydrogenated fats on serum lipoprotein cholesterol levels [published correction appears in *N Engl J Med.* 1999; 34:856]. *N Engl J Med.* 1999; 340:1933-1940.

5. <http://hc-sc.gc.ca/fn-an/nutrition/gras-trans-fats/index-eng.php>

6. Kritchevsky S and Kritchevsky D. Egg consumption and coronary heart disease: an epidemiological overview. *J Am Coll Nutr.* 2000; 19(5):549S-555S.

7. Pollan M. *In Defense of Food: An Eater's Manifesto.* Penguin 2008.

8. *Fats and Fatty Acids in Human Nutrition, Food and Agriculture Org of the UN, 2008*

9. Virtanen JK, et al. *Dietary Fatty Acids and Risk of Coronary Heart Disease in Men: The Kuopio Ischemic Heart Disease Risk Factor Study. Arteriosclerosis, Thrombosis, and Vascular Biology, 2014.*

10. Appel LJ. *The effects of carbohydrate, protein, and fat intake on cardiovascular risk factors: main results from the OmniHeart Feeding Study. Program and abstracts from the American Heart Association Scientific Sessions 2005; November 13-16, 2005; Dallas, Texas. Late Breaking Clinical Trials III.*



Dr Warner Mampuya, MD PhD FRCPC

Living and Thriving with Cardiovascular Disease - Designing and Implementing an Education Program for Patients

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Workshop presented at CACPR October 2014

A strategic focus for the UHN Cardiovascular Prevention and Rehabilitation Program was the development of a comprehensive multi-modal education tool; “The Cardiac College” to support patients and families following an acute cardiovascular event.

Although patient and family education exists in many cardiovascular rehabilitation programs and is included in the guidelines for cardiac rehabilitation, an initial phase of this project included an environmental scan to determine the process taken to develop an educational curriculum, content of the curriculum and the scope of the education. The results informed the team that a coordinated approach of curriculum design, education mapping and online educational learning management system that included: patients in the process, the utilization of theoretical frameworks and the commitment to ensuring both knowledge and behaviour change strategies were implemented throughout the process did not exist elsewhere.

Four theoretical frameworks guided the team toward developing and mapping the curriculum development. Constructive Theory of Learning, Health Action Process Approach for behaviour change, Adult Learning theory and Self-management theory underpinned the content development of the curriculum with the ultimate goal of increasing the knowledge of our patients referred to our care and promoting long term behaviour change.

Using a backward curriculum design, five Program Learning Outcomes were developed from the initial work that reflected what patients would be able to accomplish by the end of a six-month cardiac rehab (CR) program. The five Program Learning Outcomes included:

- Taking charge of your medical condition

From the Editor

In this issue of CV Edge, we bring you the highlights from the presentations, workshops and events of the 2014 annual cardiovascular conference held in the beautiful city of Vancouver. The theme of this conference was “evolution of Cardiovascular Practices: from Rehabilitation to Prevention.” As cardiac rehabilitation and prevention professionals, we need very practical tools to be able to help our patients. This conference provided us a wonderful opportunity to learn how to move beyond theory. This issue’s first article by Nina Hirvi provides practical tips for healthy eating, an important concept in this age of conflicting messages in nutrition. The workshops were a huge success and provided a great opportunity to acquire practical methods for improving patient care in cardiac rehabilitation. The second article summarises the workshop organized by the UHN team on “Living and Thriving with Cardiovascular Disease - Designing and Implementing an Education Program for Patients.” During this workshop, attendees were also provided with excellent cardiac rehabilitation materials developed by UHN.

We have selected some abstracts of presentations for this highlight edition and we hope they will help you advance your knowledge of local studies and your expertise in cardiac rehabilitation and prevention. We would like to acknowledge presentations from the two award recipients at the 2014 conference: Avi Biswas from the University of Toronto (PhD level)

- Developing strategies to improve your risk factors for cardiovascular disease
- Maintaining an exercise program to improve your health and well-being
- Incorporating healthy food choices and practices to manage your health and well being
- Developing strategies to manage your psychosocial risks for cardiovascular disease.

Educational content was developed to reflect these overarching Program Learning Outcomes. Commitment towards knowledge uptake and behaviour change was addressed; the curriculum included learning activities to help solidify patient knowledge and assess patients' motivation and confidence to incorporate long lasting lifestyle change through action planning. Supporting the educational curriculum was the concurrent development of the online component www.cardiaccollege.ca.

UHN Cardiovascular Prevention and Rehabilitation Program treats over 2200 patients per year with education and exercise as its medication. Working with the multi-disciplinary team to support patients referred to the program following an acute cardiovascular event (myocardial infarction, coronary artery bypass graft, percutaneous intervention, valve repair and replacement, arrhythmia, implantable device insertion (including VADs, pacemakers and defibrillators), heart failure, heart transplant, transient ischemic attack and stroke) or chronic disease management such as diabetes or breast cancer; much of the education is delivered in group format to support the large class size. The need for a resource to support self-management and enhance long lasting behaviour change strategies was evident. The result was "The Cardiac College" beginning with the development of "An educational curriculum for patients and families Living and Thriving with Cardiovascular Disease".

The interprofessional and multi-disciplinary Patient and Family Education Committee applied a systematic framework (Toronto Rehab Clinical Best Practice model and process) to implement this new education program. This included: determining patient needs, reviewing present practice, determining best practice, analyzing gaps, preparing, implementing and facilitating the practice, and evaluating and sustaining the practice. Each phase of the model lent itself to various activities that engaged patients and staff members including: developing a patient and family education curriculum framework, establishing patient learning needs with patient focus groups and research based learning needs assessment, environmental scans, literature reviews and review of best practice guidelines for cardiovascular education.

Initially, in November 2013, eight focus groups were held with a total of 24 patients and 1 spouse. The goal of these focus groups was to gather information about the initial version (v1.0) of the workbook to help the goal of producing a high quality patient education workbook based on patient need, and best practice while promoting change in knowledge and health behaviour.

A 21-item discussion guide was developed to guide the discussion. This descriptive analysis included the goals and visions of the patients by the completion of the CR program, the satisfaction of the workbook to support these goals and visions, the use of the tool, recommended changes and content relating to pictures/graphics, language and content, learning activities and how this tool could be used post CR. The main findings of these sessions

winner) and Alis Bonsignore from the University of British Columbia (Master level winner). Avi Biswas's presentation "Determining the Cost-Benefit Yields of Participating in a Cardiac Rehabilitation Program" underscored the potential utility of risk stratification when estimating the cost-benefit of CR programs. Alis Bonsignore's presentation on "Race Length and Response of Vascular Stiffness in Ultra-Marathon Runners" explored long-term cardiovascular disease risk associated to changes in vascular stiffness in ultra-marathon runners.

We should mention the annual keynote Terry Kavanagh lecture that was masterfully delivered by Dr. Andrew Pipe. The title of his presentation was "From whence? To Where? CVD Prevention and Rehabilitation in the 21st Century." Dr Pipe reviewed scientific advancements in the evolution of cardiovascular practices of the last few decades and suggested ways to improve cardiovascular disease prevention to reduce mortality, morbidity and costs.

The program presented by the CACPR was excellent and we thank the organizing committee for their outstanding work! The conference was a real success as witnessed by large attendance and the quality of the presentations.

Finally, we include the Results of the 2014 CACPR Member Survey by Chelsea Salsberg and Sherry L. Grace. This report on the results from the survey of Canadian CR programs provides an update on the status of CR across Canada.

We thank you for your contribution in the advancement of cardiac rehabilitation and prevention in Canada and wish you a happy and blessed New Year 2015.

were used to support the 2nd version of the workbook (v 2.0).

The evaluation of the workbook and curriculum was the focus of a PhD student during the past year and as such was rigorously evaluated and critiqued. CR patients (n=146) were tested pre and post participation in the UHN Cardiovascular Prevention and Rehabilitation program. Participants were invited to complete a self-administered confidential survey at two (2) specific time points (prior to beginning CR and between 22 and 24 weeks of current programming). The results of these self-administered surveys showed significant changes (increases) in:

- Knowledge (overall and by area: medical, risk factors, exercise, nutrition and psychosocial risk) (P<.001)
- Risk awareness (p=.003)
- Program outcome expectations (p=.005)
- Task self-efficacy (p=.002)
- Action planning (p<.0001)
- Coping planning (p<.001)
- Weekly physical exercise hours (p<.001)
- Frequency of walking 3-4 times per week (p=.04)

(Ghisi, 2014)

The evaluation results show initial promise to support the education and curriculum developed to enhance patient care and education. A patient shared with the CR program comments his feeling regarding the workbook. This email is shared below in its entirety to understand the impact this resource has had within the program.

Date: June 7, 2013

Subject: The Workbook

"...I started cardiac rehab this past Monday – it was a pleasure meeting you.

I have been reading the Education Workbook, and I wanted to send you a note to let you know what a comprehensive and impressive document this is! I can't imagine the amount of time and effort that went into creating this.

I had been reading lots of information provided to me by Medcan, the Cleveland Clinic and other publications from around the world and nothing I have seen comes close to this Workbook.

I wanted to let you know how helpful this Workbook has been already to me, less than a week in!

Thank you,... and please, extend my thanks and appreciation to everyone who worked on this magnificent Workbook."

The UHN Cardiovascular Prevention and Rehabilitation team was pleased to provide a workshop at Canadian Cardiovascular Congress - Canadian Association of Cardiovascular Prevention and Rehabilitation Conference in October, 2014, sharing our experience presenting the best practice process and research frameworks used to develop the elements of the Cardiac College. During the workshop, the education workbook was offered to all participants for use in their Cardiovascular Rehabilitation Programs as a patient resource tool. This tool is also readily available for all readers to view at www.cardiaccollege.ca.

Throughout the development of this workbook, careful attention was made to ensure that the materials could be implemented into other programs, that the information was free from specific program identifiers (with the exception of the first and last chapter) and to provide any program with the opportunity to utilize the information to support a clear and consistent messaging of relevant education to the patient. The initial chapter can be modified to support any program design or composition and as such this tool can be easily supported in other programs across the city, the province, the country and the world.

CACPR Abstracts 2014; Vancouver, BC

This year again many researchers and students submitted the results of their works for presentation at the annual meeting of the CACPR. Some of these works were accepted for oral presentations or posters at the Symposium. Below is a compilation of abstracts presented at the conference:



2014 PhD Level Winner

1. DETERMINING THE COST-BENEFIT YIELDS OF PARTICIPATING IN A CARDIAC REHABILITATION PROGRAM

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Advisor: Dr. Darren Warburton

Background and Objective: Regular participation in cardiac rehabilitation (CR) has consistently been shown to significantly improve survival prognosis and reduce hospitalizations among patients suffering from a recent cardiovascular episode. Assuming that the efficacy associated with CR is more or less similar across subgroups, the outcome yield and cost-benefit of CR are based on two factors: patient baseline risk for future events/hospitalizations and risk of behavioral attrition (program drop out). No study has quantified the thresholds of baseline risk and behavioral attrition beyond which the cost-benefits of CR become economically unattractive from a health services and policy perspective. We aimed to determine how the cost-benefits associated with CR vary across patient baseline risk and behavioral attrition patterns amongst an actual population of patients participating in an outpatient CR program. **Methods:** Data was obtained from 11,998 consecutive patient referrals to Toronto Rehab's Cardiac Rehabilitation and Secondary Prevention Program from 1995 to 2010. Baseline risk was defined as the probability of death/hospitalization at 2 years following the program's pre-scheduled termination and behavioral attrition risk was defined as the probability of program drop-out. We assumed a fixed cost of \$1500 per program and a fixed program efficacy of 20% reduction in death/hospitalization. Multiple logistic regression models were used to predict the number of deaths/hospitalizations avoided per 1000 patients treated (adjusted for baseline programmatic and patient characteristics). **Results:** Multiple logistic regression models for baseline risk produced a C-statistic of 0.66, and baseline behavioral attrition, C-statistic was 0.85. Increasing age and type 2 diabetes were found to be concordant predictors of CR cost-benefit and higher baseline functional capacity as a discordant predictor. The correlation between risk of program drop out and baseline risk was poor ($r=0.22$, $p<0.001$). For each quartile of program cost to yield, the relative risk (RR) for each 10% behavioral attrition increase was found to be 0.87 (95% CI: 0.85, 1.89), while for each 10% baseline risk increase, RR was found to be 1.36 (95% CI: 1.34, 1.37). When assessing both risk factors as predictors of improved cost-benefit yield (\$1000 cost per adverse-event avoided) for each 10% increase in behavioral attrition risk, RR was 1.21 (95% CI: 1.207, 1.213) and RR for each 10% increase in baseline risk was 0.63 (95% CI: 0.62, 0.64). **Conclusion:** This research underscores the potential utility of risk stratification and thresholds of patient baseline and behavioral attrition risk when estimating the programmatic and cost-benefit of CR programs.

2. A COMPARISON OF THE EFFECTIVENESS OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR INTERVENTIONS IN REDUCING SEDENTARY TIME IN ADULTS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CONTROLLED TRIALS

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Background: Sedentary behaviours (SBs) are independent risk factors for several chronic diseases and premature mortality. It remains unknown as to whether physical activity (PA) interventions have the capacity to reduce time spent being sedentary beyond gains in PA (i.e. increase of 30 minutes of PA = decrease of 30 minutes of sedentary time) or whether more targeted interventions are warranted. The objective was to systematically review the literature to compare the effectiveness of controlled interventions with a focus on PA and/or SBs (PA only versus PA+SB versus SB only), for reducing sedentary time in adults. **Methods:** Six electronic databases were searched and experts in the field were solicited to identify all studies that examined the effects of an intervention which targeted either PA and/or SB and that reported on changes in SBs (sedentary, sitting or TV time). Two independent reviewers performed abstract and full text screening, data abstraction and quality assessments. A qualitative synthesis was performed for all studies, and meta-analyses were conducted using studies with mean difference in minutes/day of sedentary time between intervention and control groups. All studies were assessed for quality. Risk of bias and strength of the evidence were assessed for all studies used in the meta-analyses. The review was registered with PROSPERO: CRD42014006535. **Results:** Sixty-five unique intervention studies with a control arm met inclusion criteria; 33 were used in meta-analyses (PA=20, PA+SB=7, SB=6). Interventions which focused on PA or PA+SB were lower in quality, produced less consistent findings and

generally resulted in modest reductions in sedentary time (PA: SMD = -0.22 (95% CI: -0.35, -0.10), PA+SB: SMD = -0.37 (95% CI: -0.69, -0.05)). Moderate quality evidence from the RCT meta-analysis coupled with the qualitative synthesis of data provides consistent evidence that large and clinically meaningful reductions in sedentary time can be expected from interventions with a focus on reducing SBs (SMD = -1.28 (95% CI: -1.68, -0.87)). Reductions in sedentary time among the SB interventions equate to ~91 minutes/day and are significantly larger than those among the PA (~19 minutes/day) or PA+SB (~35 minutes/day) interventions. **Conclusion:** There is moderate level evidence to support the conclusion that interventions which focus primarily on SBs result in clinically significant reductions in these behaviours, while those which focus on combined SB+PA are better than those that focus solely on PA. Future interventions would benefit from testing the intensity of SB focus that is needed to obtain clinically significant reductions.

3. IMPROVED INSOMNIA SYMPTOMS CONTRIBUTE TO REDUCTIONS IN TOTAL CHOLESTEROL, TRIGLYCERIDES, AND DEPRESSIVE SYMPTOMS IN PATIENTS WHO COMPLETE CARDIAC REHABILITATION CR

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Background: Insomnia symptoms are prospectively associated with risk of cardiovascular disease (CVD) morbidity and mortality, and are commonly reported by patients with CVD. Exercise participation contributes to improvements in both sleep and cardiovascular risk, but the extent to which improvements in insomnia might potentiate improvements in CVD risk is unknown. **Aim:** To investigate whether greater reductions in insomnia symptom severity during exercise-based cardiac rehabilitation (CR) are associated with greater improvements in CVD risk factors. **Methods:** Measures of insomnia symptom severity (Insomnia Severity Index; ISI) and CVD risk (cholesterol [LDL, HDL, total cholesterol, triglycerides], body mass index, waist circumference, blood pressure, functional capacity [peak METs], and depressive symptoms [Hospital Anxiety and Depression Scale]) were obtained pre- and post-CR from 100 patients who completed at least 75% (18/24) of scheduled supervised exercise sessions, held twice weekly for 12 weeks at Total Cardiology Rehabilitation and Risk Reduction Centre in Calgary, AB. Difference scores were calculated for each measure (post-CR minus pre-CR). Hierarchical regression analyses were conducted with difference scores for each measure of CVD risk as the dependent variable. Baseline values of ISI and CVD risk were entered in Block 1 as covariates, and ISI difference scores were entered in Block 2 as the independent variable. **Results:** Completion of CR was associated with improvements in insomnia symptom severity from “subthreshold” (ISI >7) to “no clinically significant insomnia” (ISI ≤7), $t(99)=3.31$, $p<.001$, and in total cholesterol, HDL, LDL, triglycerides, functional capacity, waist circumference, and depressive symptoms ($ps <.05$). Greater improvements in insomnia symptom severity were associated with greater reductions in triglycerides [$\Delta F(1, 96) = 4.9$, $SE = .70$, $\Delta R^2 = .05$, $p = .03$] and depressive symptoms [$\Delta F(1, 96) = 17.38$, $SE = 1.9$, $\Delta R^2 = .10$, $p < .001$], and were marginally associated with reductions in total cholesterol [$\Delta F(1, 96) = 3.49$, $SE = 0.76$, $\Delta R^2 = .03$, $p = .06$], after adjusting for baseline ISI and values on each respective CVD risk measure. **Conclusions:** Completion of CR may contribute to improved sleep that, in turn, is associated with improvements on some indices of CVD risk. Future research should examine the extent to which objective measures of exercise behaviour are associated with insomnia in CR patients, and explore bio-behavioural mechanisms through which improved sleep may reduce CVD risk.

4. THE LINK BETWEEN HEALTH LOCUS OF CONTROL AND SELF-DETERMINATION THEORY FOR MEDICATION ADHERENCE

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Background and Aims: Motivation to engage in health behaviours may be intrinsic (rewarding to the individual because the behavior is, in itself, satisfying) or extrinsic (due to external pressures or goals). Self-determination theory posits that intrinsic behaviours are motivated by three innate needs: Competence, the desire to master skills and control outcomes; Autonomy, the ability to freely choose behaviours and be a causal agent of change in accordance with one’s self-concept; and Relatedness, the desire to be connected with others. These needs may be influenced by personality traits, such as health locus of control (HLOC). This may be Internal, if the individual

believes they control their own health, or External, in which they believe physicians, other individuals, or fate is responsible. This study examined if HLOC was associated with autonomous motivation and perceived competence for medication adherence in a sample of cardiac outpatients. **Methods and Materials:** Outpatients undergoing exercise stress testing at the Montreal Heart Institute were recruited and mailed a questionnaire package at a two-year follow-up (n=496), including the Multidimensional Health Locus of Control scale, form C (featuring internal, doctor, chance, and others sub-scales), the Treatment Self-Regulation Questionnaire (TSRQ) and the Perceived Competence Scale (PCS), both for medication adherence. **Results:** A Relative Autonomy Index (RAI), representing autonomous motivation to engage in medication adherence, was calculated using TSRQ sub-scales. Higher RAI scores were associated with higher Doctor HLOC ($\beta=.50$, $SE=.17$, $p<.01$), lower Others HLOC ($\beta=-.53$, $SE=.14$, $p<.01$), and lower Chance HLOC ($\beta=-.46$, $SE=.08$, $p<.01$) scores. RAI scores were not associated with Internal HLOC ($p=.10$). Higher PCS scores were associated with higher Doctor HLOC ($\beta=.22$, $SE=.05$, $p<.01$) and lower Chance HLOC ($\beta=-.05$, $SE=.03$, $p=.04$) scores. PCS scores were not associated with Internal HLOC ($p=.95$) or Others HLOC ($p=.58$). General linear model were adjusted for CVD, age, sex, education, and cohabitation status. **Conclusions:** Patients who believe that fate is responsible for their health tend to possess less autonomous motivation and perceived competence to engage in medication adherence, while patients who believe other individuals control their health also possess less autonomous motivation. Interestingly, patients believing physicians were responsible for their health possessed more autonomous motivation and perceived competence, suggesting there is a role for physicians in supporting these needs. Surprisingly, internal HLOC was not associated with either autonomy or competence, possibly because prescription medication use requires direction by physicians. Replicating this study focusing on other, more patient directed behaviours may show different results.

5. PSYCHOMETRIC PROPERTIES OF QUESTIONNAIRES DESIGNED TO ASSESS THE KNOWLEDGE OF HEART FAILURE PATIENTS WITH REGARDS TO THEIR DISEASE: A SYSTEMATIC REVIEW

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Heart failure (HF) is a serious chronic condition and a significant contributor to morbidity and health-related costs. Several studies have demonstrated a positive effect of education and counseling on management, self-care, quality of life, readmission, and mortality of HF patients. Improvement of knowledge about HF is considered to be one of the underlying mechanisms that explain the improvement of these outcomes. To evaluate the effect of education, it is therefore important to assess the level of knowledge of HF patients, which is usually performed using questionnaires. The accuracy of ratings provided by these instruments can be affected by many methodological factors, including the quality of the instrument in terms of psychometric properties. The aim of this systematic review was to describe the psychometric properties of English and Portuguese language questionnaires designed to assess the knowledge of HF patients with regards to their disease. **Methods:** A literature search of electronic databases was conducted for published articles from database inception to March 2014. Eligibility criteria included articles describing the development and psychometric validation of English and Portuguese questionnaires assessing HF patients' knowledge about their disease. Outcomes were (1) content validity, (2) internal consistency, (3) criterion validity, (4) construct validity, (5) reproducibility, (6) responsiveness, (7) floor and ceiling effects, and (8) interpretability, as per the quality criteria for measurement properties of health status questionnaires. Articles were considered for inclusion by 2 authors independently. Disagreements were resolved through a third author. **Results:** Overall, 10 articles were included, of which 1 was a randomized controlled trial and 3 were quasi-experimental. Ten original instruments were identified; of these, 9 were English-language questionnaires. The number of items ranged from 3 to 30. Items were derived from the literature (n=6), expert panel (n=6), pilot study (n=3), or unknown sources (n=1). A mean of 181.2 ± 243.3 patients completed the instruments. With regards to outcomes, content validity was documented for 4 instruments, internal consistency for 9, criterion validity for 1, construct validity for 7, reproducibility for 1, responsiveness for 4, and ceiling effects for 1. None of the studies reported all the quality criteria for measurement properties of health status questionnaires. **Conclusion:** Although English and Portuguese questionnaires assessing HF patients' knowledge about their disease are considered valid, their psychometric properties are poorly assessed or described in the literature. Journals should require minimum evidence of psychometric properties when reporting results of development of questionnaires.

6. GAIN AND MAINTENANCE OF FUNCTIONAL CAPACITY IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE IN A REHABILITATION PROGRAM: A PILOT STUDY.

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Rationale: Vascular Rehabilitation including supervised aerobic training is the gold standard treatment to improve the functional capacity of patients with intermittent claudication. However, there is a lack of evidence on the maintenance of gains after discharge. Objective: to evaluate the effects of a vascular rehabilitation program in the functional capacity of patients with Peripheral Arterial Disease and its maintenance. **Methodology:** 10 patients (6 men), aged 62.11 ± 6.86 years, with intermittent claudication and reporting functional limitation. The program was developed in an outpatient university center and consisted of two sessions per week with the following aerobic training: walking as fast as possible until maximum claudication totalizing 30 minutes excluding breaks. Patients were oriented about the disease and treatment and also to realize one additional session per week at home. After discharge, they were instructed to continue the training at home, three times per week. Patients were evaluated at baseline, discharge, one and five months after discharge (follow up). The assessments included the Incremental Shuttle Walking Test (ISWT) to verify the time of maximum pain and the total distance covered and the Standing Heel Rise Test (HRT) for ankle plantar flexion to record the number of repetitions, speed and duration of the test. Results are expressed as mean \pm SD. Data distribution was assessed by the Shapiro - Wilk test, comparisons by ANOVA for repeated measures plus Bonferroni test, alpha = 5 %. **Results:** The average number of sessions was 45 ± 19 . At the end of the program and at the two follow-up periods, highest values were observed compared to baseline for the variables total distance traveled and time of maximum pain on the ISWT and for the number of repetitions in HRT ($p=0.047$, $p=0.049$ and $p=0.002$, respectively). No significant difference was observed between discharge and follow-up periods. **Conclusion:** The supervised vascular rehabilitation program improved the functional capacity of patients with Peripheral Arterial Disease. The improvement was maintained through home based program. These data indicate that the proposed protocol was effective and applicable in clinical practice. Support: FAPEMIG and CNPq.

7. CHRONIC KIDNEY DISEASE IN CANADIAN CARDIAC REHABILITATION CENTRES: A BRIEF REPORT FROM THE CANADIAN CARDIAC REHAB REGISTRY

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Background: The cardiovascular (CV) consequences of chronic kidney disease (CKD) account for almost half of all-cause mortality in renal patients, with the incidence of death approximately 10 to 30 times higher than in the general population. Amongst those about to start dialysis treatment, 40% already have evidence of coronary heart disease prompting the National Kidney Foundation to include all persons with CKD in the "highest risk" group for CV disease. Furthermore, the Kidney Disease Quality Outcomes Initiative guidelines recommend the referral to cardiac rehabilitation (CR), in order to manage the risk factors associated with CV disease. However, there is limited data on the prevalence of CKD amongst Canadian participants in CR programs. The purpose of this study was to identify the prevalence of CKD amongst Canadian CR centres and to explore the potential of using the Canadian Cardiac Rehab Registry (CCRR) as a tool to evaluate the impact of CR for persons with CKD. **Methods:** We performed a retrospective, observational study of the CCRR in order to determine the prevalence of CKD amongst a cohort of CR participants who completed treatment between inception and September 10th, 2012. Inclusion criteria were: participants >18 years of age, and having valid baseline entries for age, gender, ethnicity, and serum creatinine in order to calculate estimated glomerular filtration rate (eGFR). **Results:** Of the 4,571 registry participants, 526 had a valid serum creatinine at program intake; 499 had complete demographic information required to calculate eGFR. Participants in the study cohort were 63.2 ± 10.8 years of age, predominantly male (64.3%), of Caucasian ethnicity (89.4%), and traveled 30 minutes or less to attend CR (72.4%). With respect to their CV risk factors, 47.3% had a sedentary lifestyle, 69.0% had hypertension, 73.4% had hyperlipidemia, 62.7% had a positive family history, 28.9% had diabetes, and 24.9% were smokers. Approximately half had normal left ventricular function (54.4%) and on average were obese (body mass index: 30.6 ± 6.3). **Conclusion:** The proportion of participants with CKD enrolled in CR Centres in Canada is significant. Through the inclusion of simple indicators of renal function, the CCRR holds promise as a powerful tool to monitor the impact of CR for persons living with CKD. Further analyses are underway to characterize the cohort of CCRR registrants with CKD and to determine the impact of CKD on CR outcomes.



2014 Masters Level Winner

8. RACE LENGTH AND RESPONSE OF VASCULAR STIFFNESS IN ULTRA-MARATHON RUNNERS

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Advisor: Dr. David A. Alter

Introduction: Recent evidence suggests that ultra-marathon runners demonstrate higher measures of vascular stiffness compared to their recreationally active counterparts. Moreover, changes in vascular stiffness are apparent following ultra-marathon events (>100 miles) and present with a temporal response throughout the race. Whether shorter duration events lead to similar changes in vascular stiffness compared to longer duration events is unknown. The purpose of this research is to determine if participants in shorter duration ultra-marathon events experience a change in vascular stiffness measures and whether these changes are similar compared to those participating in longer events. **Methods:** A total of 33 recreational ultra-marathon runners, 10 participants (41.2 ± 10.2 ; 6 females) in the 30 mile event, 12 participants (40.5 ± 6.68 ; 5 female) in the 50 mile event and 11 (41.45 ± 6.3 , 2 female) in the 100 mile event who completed one of two ultra-marathon events were recruited. Arterial compliance was measured via radial applanation tonometry (CR-2000, HDI) for diastolic pulse contour analysis (pre- and post-race). **Results:** There were no significant differences between groups in the participant characteristics (including age, body mass index, and height) or arterial compliance (large and small). There was a significant decrease in small artery compliance (i.e., increase in vascular stiffness) in the 30 mile (8.7 ± 1.7 to 6.3 ± 2.5 mL/mmHg \times 100) and 50 mile (10.0 ± 3.7 to 6.6 ± 1.9 mL/mmHg \times 100) groups ($p < 0.05$). There was a small but non-significant change small artery compliance in the 100-mile (8.1 ± 2.2 to 6.6 ± 2.2 mL/mmHg \times 100) group. Large artery stiffness measures did not significantly change following the 30 mile (16.09 ± 2.94 to 14.5 ± 4.75 mL/mmHg \times 10) and 50 mile (16.9 ± 2.5 to 17.7 ± 3.7 mL/mmHg \times 10) event, although there was a significant decrease in large artery compliance following the 100 mile event (17.9 ± 5.7 to 14.5 ± 4.7 mL/mmHg \times 10) ($p < 0.05$). **Conclusion:** Recreational ultra-marathon runners experience changes in vascular stiffness measures, despite differences in race lengths. Whether these changes in vascular stiffness measures following an ultra-marathon event lead to long-term cardiovascular disease risk remains to be elucidated.

9. HOW PHYSICALLY ACTIVE ARE CANADIAN REGISTERED NURSES WORKING IN A TERTIARY CARE CARDIOVASCULAR HEALTH CENTRE?

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Background: Nurses comprise the largest professional group within the Canadian health care workforce. Findings from the recent National Survey of the Work and Health of Nurses in Canada revealed that 45% of nurses reported being overweight or obese. A concerning percentage also reported having high blood pressure, high cholesterol, diabetes, heart disease and cancers. These findings suggest that the physical activity (PA) levels of Canadian nurses are below the recommended guidelines (10,000 steps/day), as it is well documented that low levels of PA are associated with poor metabolic and cardiovascular health. The purpose of this study was to objectively examine the PA levels of Canadian registered nurses from a mix of rural and urban settings working in a tertiary care cardiovascular health centre. **Methods:** Nurses wore a Tractivity® accelerometer (Tractivity, Vancouver, BC) held in an ankle band for at least 10 hours per day throughout a 4-week observation phase. Height, body composition using bioelectrical impedance (UM-041, Tanita), blood pressure and heart rate (BpTRU) and waist circumference (SECA 201) were assessed in triplicate during week 3 of the observation phase. **Results:** 76 nurses (74 females, 2 males; mean \pm SD = age: 46 ± 11 years; height: 165 ± 7 cm; BMI: 27.6 ± 5.5 kg/m²; body fat: 36.6 ± 8.5 %; waist circumference: 83.9 ± 12.9 cm; resting blood pressure: $115 \pm 12/75 \pm 8$ mm Hg; resting heart rate: 68 ± 9 bpm) participated in this study. More than half (54%) of the nurses were categorized as overweight (BMI: 25.0 - 29.9 kg/m²; $n=16$) or obese (BMI: ≥ 30.0 kg/m²; $n=25$), and 35% ($n=26$) of female nurses were categorized as having a high waist circumference (wc: ≥ 88 cm). The nurses walked an average of 9712 ± 2574 steps/day. Few (39%) nurses met the recommended 10,000 steps/day guidelines. A significantly higher waist circumference (87 ± 13 vs. 80 ± 12 cm, $p=0.020$) and trend for higher BMI (28.5 ± 0.9 vs. 26.2 ± 0.8 kg/m², $p=0.058$), body fat (38.1 ± 1.3 vs. 34.5 ± 1.4 %, $p=0.076$) and resting heart rate (69 ± 1 vs. 65 ± 2 bpm, $p=0.066$) was observed in nurses who did not meet the 10,000 steps/day guidelines when compared to nurses who met

the guidelines. No significant differences in steps/day between nurses who worked days (n=40), nights (n=5) or days and nights (n=29) in clinical, administrative and/or managerial roles were observed ($p>0.05$). Conclusions: Future interventions are needed to target the low PA levels of Canadian nurses. Worksites may be an opportune place to target PA behaviour in an effort to improve the PA levels as well as metabolic and cardiovascular health of nurses.

10. IMPROVEMENTS IN CARDIOVASCULAR DISEASE RISK FACTORS AND SELF-EFFICACY IN PATIENTS ATTENDING CARDIAC REHAB

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Purpose: The aim of this study was to determine the effect of lifestyle changes on cardiovascular disease risk factors, functional capacity and self-efficacy in patients participating in a cardiac rehabilitation program.

Methods: In this prospective observational study, patients with coronary artery disease admitted to an outpatient cardiac rehabilitation (CR) program were followed. Selected clinical and self-efficacy variables were measured at baseline and end of program. **Results:** 134 males and 49 females (mean age 63.9 ± 10 years) completed their CR program. Significant changes in low-density lipoprotein (1.99 ± 0.91 mmol/L to 1.86 ± 0.83 mmol/L, $p = 0.007$) and high-density lipoprotein (1.17 ± 0.35 mmol/L to 1.23 ± 0.35 mmol/L, $p = 0.0005$) cholesterol, resting systolic (126 mmHg ± 18 to 121 ± 15 , $p = 0.0002$) and diastolic (76 ± 9 to 74 ± 10 , $p = 0.016$) blood pressure and peak oxygen uptake (18.66 ± 7.11 ml min⁽⁻¹⁾ kg⁽⁻¹⁾ to 23.45 ± 9.43 ml min⁽⁻¹⁾ kg⁽⁻¹⁾, $p = 0.02$) were observed. A significant improvement in self-reported changes in functional capacity using the Duke Activity Status Index (34.34 ± 14.42 to 42.33 ± 14.3 , $p < 0.0001$) and self-efficacy using the 13-point Cardiac Self Efficacy (2.84 ± 0.79 to 3.20 ± 0.67 , $p < 0.0001$) and 6-point Stanford Self Efficacy (7.32 ± 2.08 to 8.08 ± 1.06 , $p < 0.0001$) scales were also observed. **Conclusion:** In addition to the physiological benefits of CR, patients also experience an improvement in their self-efficacy for managing their chronic disease and associated symptoms.

Results of the 2014 CACPR Member Survey

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Acknowledgments: We gratefully acknowledge Karam Turk-Adawi, PhD for her work in developing the protocol and survey, and for administering the survey in countries where Arabic is an official language.

Introduction

Each year, the Canadian Association of Cardiovascular Prevention and Rehabilitation (CACPR) sends an online survey to its members. This serves to inform the membership committee of the composition of our members, which in turn supports them in best meeting the needs of you, the members. For the 2014 survey, the association was agreeable to administering a more comprehensive survey not just for internal information, but for a broader research project.

Because of the increasing awareness of the critical role of cardiovascular rehabilitation (CR) in reducing cardiovascular disease morbidity and mortality and the cost-effectiveness of these programs, strategic surveys of CR programs have been conducted to assess availability, characteristics, and components, as well as the characteristics of patients served. These surveys have been carried out at regional and national levels, in Canada^{1,2}, Japan³, Denmark⁴, Italy⁵, Spain⁶, the United Kingdom⁷, United States^{8,9}, Europe¹⁰, Latin America¹¹, and recently in South America¹².

CACPR is a founding association of the International Council of Cardiovascular Prevention and Rehabilitation

(ICCPR; www.globalcardiacrehab.com). In accordance with the aims of the ICCPR, specifically to ensure broader access to CR services and support countries to establish and augment CR programs¹³, we have embarked on several initiatives. One of these initiatives is to survey CR programs across the globe to be better informed about delivery capacity, and the nature of services offered for example, and to compare these findings across different regions internationally. Herein we report on our initial progress towards this goal, by sharing with you, CACPR members, results from our survey of Canadian CR programs.

Methods

Design and Procedure

This cross-sectional study was approved by York University's Office of Research Ethics. A review of the literature was undertaken to identify all studies reporting results of surveys of CR programs. The 12 articles cited in the introduction were identified. The corresponding authors of each article were contacted and invited to collaborate in development of an integrated CR program survey, under the auspices of the ICCPR. For this pilot study, the survey was administered to programs in Canada, as well as countries where Arabic is an official language. Results from the latter surveys and comparison to the Canadian CR context will be reported elsewhere.

Canadian CR programs were identified and contact information secured in collaboration with the CACPR. All CR programs from the directory were initially contacted by e-mail in early 2014. The e-mails included an explanation as to what the survey would entail, in addition to the SurveyMonkey link. The instructions specified that the survey was confidential and no personal and/or CR organization names would be published. After clicking the link, respondents were led to a consent form, followed by the survey itself if they clicked to provide consent.

In an effort to improve the response rate, an email blast was sent to all CACPR members and a follow-up email was sent to all members. Finally, two follow-up phone calls were placed to all contacts; the first call took place in August 2014, followed by another in September 2014. This was done to ensure the validity of the e-mail addresses being used, and that the appropriate person was being contacted.

Participants

There were 181 unique programs in the CACPR directory. CR programs were defined as per the CACPR¹⁴. We aimed to reach the most senior member of each CR program to complete the survey.

Measures

Four authors responded to our invitation to collaborate on our study, and shared their original surveys with us. Thus, the questionnaire items were developed based on the following previously-administered surveys: the CACR 2009 survey¹⁵, the European Association for Cardiovascular Prevention & Rehabilitation Survey (EACPR)¹⁶, South American CR working group (<http://www.cuidesucorazon.org/>) Survey¹², and American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) Survey 2013⁹. The South American CR survey was translated from Spanish to English by members of the team, and provided to the South American collaborating author, who reviewed the quality of the translation. Some minor revisions were made to ensure the meaning of the items were as intended. The composite, integrated survey was then circulated to all collaborators for feedback. Several additional items were added, based on the World Health Organization's Prioritized Research Agenda for Prevention and Control of Non-Communicable Diseases¹⁷.

The survey included items related to core program components, duration of program, indications for service, medication and depression management, alternative program models, CR team composition and post-graduate offerings. These items were assessed primarily through forced-choice response options.

All data analyses were performed using SPSS version 22¹⁸. A descriptive analysis was conducted.

Results

After identifying duplicate CACPR members from the same CR programs, and discounting programs identified during the phone calls as no longer operating, there were 128 valid CR programs in the CACPR directory. Responses were received from 39 programs (30.4% response rate).

CR programs within Ontario were most frequently represented in the sample (n=21, 53.8%). The remaining

responses stemmed from New Brunswick (n=6; 15.4%), British Columbia (n=4; 10.3%), Alberta (n=4; 10.3%), Saskatchewan (n=2; 5.1%), Quebec (n=1; 2.6%) and Newfoundland (n=1; 2.6%). Respondents were most frequently CR coordinators (n=14; 35.9%), CR managers (n=12 30.8%), and less frequently a director (n=1, 2.6%) or supervisor (n=1, 2.6%). Other (n=11, 28.2%) respondents were clinical nurse leaders, exercise therapists and physiotherapists.

CR Program Characteristics

CR program characteristics are presented in Table 1. Of those programs that were in a hospital, 15 (60.0%) of the hospitals had an inpatient cardiology service, and 8 (34.8%) offered advanced cardiac treatments including revascularization.

Table 1. Characteristics of cardiac rehabilitations programs

Characteristics	N	%
Program Type		
Public	32	(82.1)
Private	4	(10.3)
Mixed	2	(5.1)
Other	1	(2.6)
Prevention Type		
Primary	1	(2.6)
Secondary	15	(38.5)
Both	23	(59.0)
Program Site		
Hospital	20	(51.3)
Community	11	(28.2)
Clinic	5	(12.8)
Satellite	2	(5.1)
Home-Based	1	(2.6)
Geographic Setting		
Urban	25	(64.1)
Rural	9	(23.1)
Other	5	(12.8)
Subsidy Available for Patients with Limited Economic Means		
No	24	(61.5)
Yes	15	(38.5)

Note: Some respondents did not answer each item and so valid percentages are reported

CCRR: Canadian Cardiac Rehab Registry

Overall, referred inpatients started CR on average 5.78 ± 3.93 (standard deviation; SD) weeks after being discharged. Programs offered an average of 2.29 ± 0.98 exercise sessions per week (median=2), for 2.25 ± 0.81 months. Costs to participate in CR were most often nil (n=23, 60.5%), <\$100 (n=3, 7.9%), \$100-\$200 (n=9, 23.7%), \$300-\$400 (n=1, 2.6%) and >\$400 (n=2, 5.3%).

Type of professional with overall CR responsibility is presented in Table 2. Healthcare professionals that were reported as routinely present during exercise sessions were as follows: nurse (n=27; 56.3%), exercise specialist (n=18; 37.5%), kinesiologist (n=17; 35.4%), physiotherapist (n=17, 35.4%), dietitian (n=6; 12.4%), physician

(n=5; 10.4%), social worker (n=2; 4.2%), cardiologist (n=2; 4.2%) psychologist (n=1; 2.1%) and pharmacist (n=1, 2.1%). Thirty-seven (97.4%) respondents reported their program staff had cardiopulmonary resuscitation training.

Table 2. Type of Professional with Overall CR Program Responsibility

	<i>N</i>	<i>%</i>
Specialist in Internal Medicine	11	(28.9)
Cardiologist	10	(26.3)
Program Director/Manager	6	(15.8)
Exercise Physiologist	5	(13.2)
Nurse	4	(10.5)
Consultant Physician	2	(5.3)

Cardiac diagnoses and procedures which are indicated for program participation are reported in Table 3. Respondents reported they estimated that 37.4±26.6% of patients had been screened for CVD risk factors prior to having the cardiac event or procedure that led them to being referred to CR. Respondents estimated that 24.3±26.6% of their patients engaged in 150 minutes of moderate to vigorous-intensity physical activity each week prior to CR.

Table 3. Cardiac Rehabilitation Program Components Offered

Component	<i>N</i>	<i>%</i>
Patient Education	36	(100)
Initial Assessment	35	(100)
Exercise Prescription	35	(100)
Physical Activity Counselling	35	(100)
Supervised Exercise Training	35	(100)
Heart Rate Measurement	35	(100)
Communication with Primary Care	35	(100)
Nutrition Counselling	34	(100)
End of Program Re-Assessment	34	(100)
CVD Risk Factor Management	33	(97.1)
Relaxation	33	(97.1)
Depression Screening	29	(85.3)
Exercise Stress Test	29	(82.9)
Smoking Cessation	27	(77.1)
6 Minute Walk Test	24	(72.7)
Self-Management Training	22	(66.7)
Prescription or Titration of Secondary Prevention Medications	22	(62.9)
Psychological Counselling	18	(52.9)
Other Tests	12	(40.0)
Alternative Forms of Exercise*	9	(26.5)
Women's Only Classes	3	(9.1)

Note: CVD: Cardiovascular disease

*e.g., yoga, dance, tai chi

Risk factors assessed in each CR program are reported in Table 4. CR program components offered are reported in Table 5. Twenty-eight (75.7%) respondents reported having electrocardiogram monitoring available for CR patients, but they each reported not using them routinely to monitor patients during exercise. Twenty-five (69.4%) respondents reported having a link to exercise programs within the community.

CR Capacity

When estimating the number of CR programs nationwide, 12 (37.5%) respondents perceived there were between 101–250 CR programs across Canada, 8 (25.0%) reported they did not know, while 6 (18.8%) estimated between 21–100 programs. Two (6.3%) estimated 0-20, 2 (6.3%) estimated between 251-500, and finally 2 (6.3%) estimated more than 500.

Almost half of respondents (n=14; 43.8%) estimated that in 2013, over 10,000 patients attended outpatient CR

Table 4. Risk Factors Assessed in the Program

Risk Factor	N	%
Blood Pressure	36	(100)
Body Mass Index	35	(100)
Waist Circumference	35	(100)
Tobacco Use	35	(97.2)
Cholesterol Fractions	33	(94.3)
HbA1c among patients with diabetes	33	(94.3)
Total Cholesterol	32	(94.1)
Harmful Use of Alcohol	32	(88.9)
Triglycerides	27	(81.8)
Glucose for Non-Diabetics	27	(81.8)
Time Being Sedentary	23	(63.9)
Sleep Apnea	18	(54.5)
Other	4	(57.1)

Note: HbA1c: Glycated Hemoglobin

*Other responses included: stress management, depression, arthritis management

in Canada. The second most frequent response was 8 (25.0%) reporting they 'did not know'. When asked to estimate the percentage of all diagnostically-eligible patients that attended outpatient CR in 2013, 13 (41.9%) respondents estimated it to be between 11-25%, 11 (35.5%) between 26-40%, 5 (16.1%) were unsure, 1 (3.2%) between 41-60% and 1 (3.2%) estimated more than 60%.

Table 5. Cardiac Diagnoses and Indications for the CR Program

	N	%
Coronary Artery Disease	39	(81.3)
Valvular Procedure or Disease	38	(79.2)
Heart Failure	34	(70.8)
Arrhythmias	29	(60.4)
Diabetes	21	(43.8)
Peripheral Artery Disease	21	(43.8)
Dyslipidemia	20	(41.7)
Hypertension	20	(41.7)
Obesity	19	(39.6)
Other*	18	(37.5)

*Other responses included: transplant, chronic obstructive pulmonary disease, adult congenital heart disease, stroke and transient ischemic attack

Annual CR capacity estimates are reported in Table 6. CR services were most often paid for by the hospital (n=18, 48.6%), patients (n=12, 32.4%), social security/government (n=7, 18.9%), private health insurance (n=4, 10.8%), or another source (n=13, 35.1%). Thirty-one (81.6%) programs reported having a dedicated space for their CR program. The cost associated with delivering components of CR is shown in Table 7. Finally, when asked how their CR program would be able to increase capacity (n=27), 12 (44.4%) programs reported greater staffing, 7 (25.9%) reported additional space, 6 (22.2%) reported additional funding, and 2 (7.4%) reported other resources.

Table 6. Cardiac Rehabilitation Capacity

	Mean± standard deviation	Median
Patient capacity/year	588.5±633.4	325
Patients/year received funding to serve	426.3±516.8	237
Patients served/year	511.8±557.5	300
Exercise sessions/week	2.29±0.98	2
Patients/session	15.8±11.2	10
Staff: Patient Ratio during supervised exercise		
Staff	2.6±5.5	2
Patient	10.6±8.2	10

Table 7. Perceived Expense Associated with CR Components

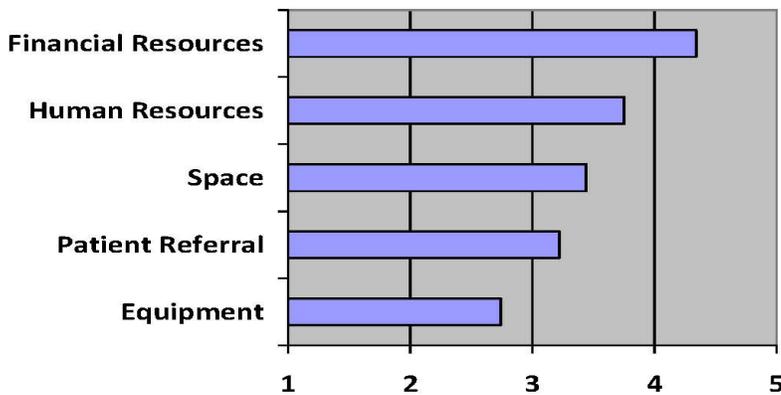
	Mean ± standard deviation
Front Line Personnel	4.17±0.71
Exercise Stress Testing on Treadmill or Cycle Ergometer	3.69±1.45
Blood Collection and Lipid Testing	3.37±2.04
Exercise Equipment	3.31±0.90
Equipment/Supplies for Risk Assessment	2.77±0.94
Blood Pressure Assessment Device	2.66±1.06
Space	2.58±1.38
Free Weights	2.48±0.98
Patient Education Materials	2.48±0.78

Note: Mean responses to costs associated with CR components on a 5-point Likert type scale from 1 (free) to 5 (very expensive).

CR Barriers

Respondents were asked to rate the importance of specific barriers to greater patient participation in CR on a scale of 1 (this is definitely not an issue) to 5 (this is definitely an issue). Responses are reported in Figure 1. Patient groups perceived as being insufficiently represented in CR are shown in Table 8.

Figure 1. Barriers to Greater Participation in CR



Note: Mean program responses to patient participation on a 5-point Likert type scale from 1 (this is definitely not an issue) to 5 (this is definitely an issue).

Table 8. Patient Groups Perceived as Insufficiently Represented in CR

Patient Group	<i>N</i>	%
Rural Patients	24	(19.7)
Patients of Low Economic Means	21	(17.2)
Patients with a Disability	17	(13.9)
Women	12	(9.8)
Patients with Musculoskeletal Problems	11	(9.0)
Older Patients	10	(8.2)
Everyone Needs More Access	9	(7.4)
Patients With Lack of Language Proficiency of Program	9	(7.4)
Minority Ethnic Groups	7	(5.7)
Patients of Certain Religious Beliefs	2	(1.6)

*Note: respondents were asked to check all that apply.

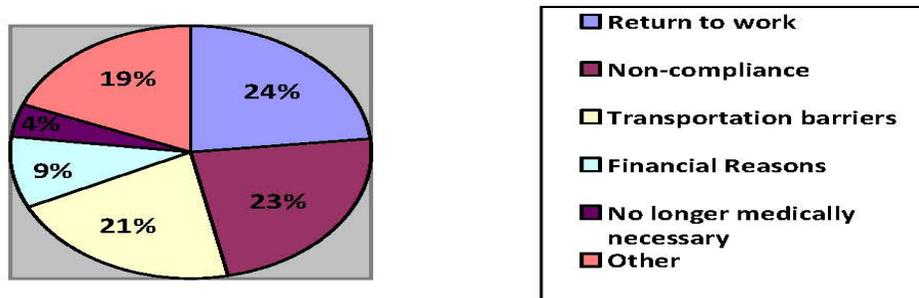
Respondents were asked to estimate the percentage of patients who leave prior to completion of the program, which they estimated as a mean of 22.3±15.5%. Then, respondents were asked to estimate the relative contribution of patient factors to the lack of CR program completion. Responses are reported in Figure 2.

Other

When asked if there are formal education or training programs offered for healthcare professionals specifically about delivering CR services in Canada, 18 (37.5%) respondents said yes, 9 (18.8%) were unsure, and 5 (10.4%) said no. Twenty-seven (84.4%) respondents agreed that the role of CR for secondary prevention of heart disease is clearly stated in our national cardiovascular clinical practice guidelines.

Figure 2

Respondent Perception of Reasons Patients Fail to Complete CR



Discussion

This survey provided an update on the status of CR in Canada, and a snapshot of CR program characteristics nationwide. Results showed that while coronary artery disease remains the primary indication for CR, 70% of programs are now treating heart failure patients, and 60% arrhythmia patients. Programs continue to serve more patients per year than they are funded to serve. They require greater financial and human resources to increase their capacity, and report their main expenses are related to front-line personnel and graded exercise testing. It is perceived that rural patients and those of low socioeconomic status continue to be under-represented in our programs. Primary reasons that patients do not complete our programs are return to work and dropout.

Limitations

Caution is warranted when interpreting these results. First, there was a low response rate. Therefore the generalizability of findings to all programs in Canada is unknown. Second, most responses stemmed from Ontario. Therefore, it cannot be determined whether the results herein are representative of programs in other provinces, particularly as reimbursement models vary provincially.

In closing, we would like to thank all of the respondents to the survey for taking the time to participate. We hope this small token of sharing the findings with you, has the intended effect of making our appreciation evident to you! Please feel free to be in touch if we can share further information, or if these findings could be further used to support the CR cause.

References

- Suskin N, Macdonald S, Swabey T, Arthur H, Vimir MA & Tihalini R. Cardiac Rehabilitation and Secondary Prevention Services In Ontario: Recommendations from a Consensus Panel. *The Canadian Journal of Cardiology*, 2003; 19(7), 833-838.
- Polyotis P, Tan Y, Prior P, et al. Cardiac Rehabilitation services in Ontario: components, models and underserved groups. *Journal of Cardiovascular Medicine*, 2012; 13, 727-734.
- Goto, Y, Saito M, Iwasaka Y, et al. Poor Implementations of Cardiac Rehabilitation Despite Broad Dissemination of Coronary Interventions for Acute Myocardial Infarction in Japan: a Nationwide Survey. *Circulation Journal: Official Journal of the Japanese Circulation Society*, 2007; 71(2), 173-179.
- Zwisler AD, Traeden UI, Videbaek K, Madsen M. Cardiac Rehabilitation Services in Denmark: Still Room for Expansion, 2005; 33(5), 376-383.
- Tramarin R, Ambrosetti M, De Feo S, et al. The Italian Survey on Cardiac Rehabilitation-2008 (ISYDE-2008). Part 3. National Availability and Organization of Cardiac Rehabilitation Facilities. *Official Report of the Italian Association for Cardiovascular Prevention, Rehabilitation and Epidemiology (IACPR-GICR)*. *Monaldi Archives for Chest Disease*, 2008; 70(4), 175-205.
- Marquez- Calderon S, Portero R, Perez de la Blanca E, et al. Incorporation of Cardiac Rehabilitation Programs and their Characteristics in the Spanish National Health Service. *Rev Esp Cardiol*, 2003; 56(8), 775-782.
- Brodie D, Bethell G, Breen S. Cardiac Rehabilitation in England: A Detailed National Survey. *European Journal of Cardiovascular Prevention & Rehabilitation*, 2006; 13(1), 122-128.
- Curnier DY, Savage PD, Ades PA. Geographic Distributions of Cardiac Rehabilitations in the United States. *Journal of*

Cardiopulmonary Rehabilitation, 2005; 25(2), 80-84.

9. Kaminsky L, Thur L, & Riggen K. Patient and Program Characteristics of Early Outpatient Cardiac Rehabilitation Programs in the United States. *Journal of Cardiopulmonary Rehabilitation and Prevention, 2013; 33, 168-172.*

10. Vanhees L, Mcgee HM, Dugmore LD, et al. A Representative Study of Cardiac Rehabilitation Activities in the European Union Member States: the Carinex Survey. *Journal of Cardiopulmonary Rehabilitation, 2002; 22(4), 264-272.*

11. Korenfeld Y, Mendoza-Bastidas C, Saavedra L, et al. Current Status of Cardiac Rehabilitation in Latin America and the Caribbean. *American Heart Journal, 2009; 158(3), 480-487.*

12. Cortes-Bergoderi M, Lopez-Jimenez F, Herdy AH, et al. Availability and Characteristics of Cardiovascular Rehabilitation Programs in South America. *Journal of Cardiopulmonary Rehabilitation and Prevention, 2013; 33(1) 33-41.*

13. Grace S, Warburton D, Stone, J et al. Internal Charter on Cardiovascular Prevention and Rehabilitation. *Journal of Cardiopulmonary Rehabilitation and Prevention, 2013; 33, 128-131.*

14. CACR. Retrieved February 26, 2014, from <http://www.cacr.ca/about/definitions.cfm>

15. Polyzotis P, Suskin N, Unsworth K, et al. Primary Care Provider Receipt of Cardiac Rehabilitation Discharge Summaries: Are They Getting What They Want To Promote Long-Term Risk Reduction? *American Heart Association Journals, 2013.*

16. Bjarnasson-Wehrens B, Mcgee H, Zwisler A, et al. Cardiac rehabilitation in Europe: results from the European Cardiac Rehab Inventory Survey. *European Journal of Cardiovascular Prevention & Rehabilitation, 2010; 17, 410.*

17. Mendis S, Alwan A, eds. *Prioritized Research Agenda for Prevention and Control of Noncommunicable Diseases.* Geneva, World Health Organization, 2011.

18. IBM Corp. (2011). *IBM SPSS Statistics for Windows: Version 22.0.* Armonk, NY: IBM Corp.

Thank you to our 2014 Sponsors



National Walk of Life 2014

LOCATION	PROGRAM NAME
Toronto, ON	Cardiac Prevention and Rehabilitation Services, Rouge Valley Health System
Sudbury, ON	Health Sciences North Cardiac Rehabilitation Program
Lindsay, ON	Ross Memorial Hospital, Cardiac Rehab Program - The Beat Goes On
St. Catherines, ON	Cardiovascular Health & Rehabilitation Program, Niagara Health System
Kelowna, BC	COACH Cardiac Rehab
Hamilton, ON	McMaster Cardiac Rehabilitation Program
Toronto, ON	GTA Walk of Life - Cardiac Health Foundation of Canada
Toronto, ON	Toronto Rehab Institute Cardiac Rehab Program
Toronto, ON	UHN Cardiovascular Prevention & Rehabilitation - Toronto Western Hospital
Breslau, ON	Cardiac Fitness Association
New Westminster, BC	YMCA Healthy Heart Program
Moncton, NB	Cardiac Rehab Program - The Moncton Hospital
Goderich, ON	Healthy Hearts Comprehensive Cardiac Rehab Program
St. Quentin, NB	Clinique de Readaptation cardiaque Hopital Hotel Dieu de St. Quentin
St. Catharines, ON	Brock-Niagara Centre for Health and Well-Being
Newmarket, ON	Southlake Regional Health Centre, Cardiovascular Prevention & Rehabilitation
Saint John, NB	Cardiovascular Health & Wellness Program, Saint John Regional Hospital
Bathurst, NB	Chaleur Regional Hospital Cardiac Rehab Program
Prince Albert, SK	FitLife Program - Cardiac/Pulmonary Rehab & Risk Management Exercise & Education
Fredericton, NB	Cardiac Rehabilitation Program, Chalmers Regional Hospital
Miramichi, NB	Cardiac Wellness Program - Horizon Health Network
Moncton, NB	Cardiac Wellness Program/ Coeur en sante
Edmundston, NB	Clinique de Readaptation cardiaque Edmundston
Sydney, NS	Cape Breton Heart Lung Wellness Program
Etobicoke, ON	Cardiac Wellness & Rehab Centre - Trillium Health Centre
Ingersoll, ON	Oxford County Cardiac Rehab & Secondary Prevention Prog.
Burnaby, BC	Healthy Heart Program - Burnaby Hospital
Winnipeg, MB	Reh-Fit Centre

Meet the 2015 Board of Directors

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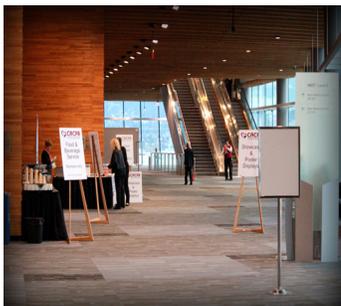
A very special thank you to Rick Stene, Saskatoon, Michelle Johnson, Toronto and Dennis Humen - London, for their terms on the board.

Conference Highlights

- 127 delegates attended the CACPR Conference
- Over 80 delegates networked and socialized at the Steamworks Brew Pub. Food was great and networking games were lots of fun!
- Sponsor feedback was very positive and they

enjoyed getting the opportunity to get to know your needs and how they could provide solutions for you and your patients.

- Save the Date for October 24 & 25, 2015 in Toronto, ON.



CALL FOR ABSTRACTS & STUDENT SCHOLARSHIP AWARDS Annual Meeting & Symposium 2015

October 24 – 25, 2015, Toronto Convention Centre in conjunction with Canadian Cardiovascular Congress

The Canadian Association of Cardiovascular Prevention and Rehabilitation is now accepting abstracts for either podium or poster presentations for the 2015 Annual Meeting and Symposium.

Presenting an abstract at the CACPR Annual Meeting is an excellent opportunity to share your research, best practices, and highlight your facility to colleagues and leaders in the field of Cardiac Rehabilitation. Abstracts are welcome on any topic pertinent to **cardiac rehabilitation, prevention and chronic disease care**. **Accepted abstract titles, authors and credentials are printed in the Journal of Cardiopulmonary Rehabilitation and Prevention (JCRP) Convention Issue, September/October 2015 and the CACPR produced Current Issues and Trends in Cardiovascular Disease Prevention and Rehabilitation (CV Edge) - Conference Highlights issue. *Full abstracts will be included in the online version of the same issue.* Posters are seen by a wide variety of cardiovascular professionals at the CCC/CACR conference.**



“At first the thought of applying for a national scholarship was daunting; my work against others across Canada, there’s no way it can compete! During my studies, I was fortunate enough to be able to submit a few smaller projects for the CACR abstract competition [as poster presentations]. I found this process relatively quite simple. The hardest part of the process was whittling my abstract down to the 400 word requirement and waiting for the response! This helped grow my confidence and refine some methodologies that I have used. When attending the conference, it was great to hear feedback from many other professionals who have different insights and “tips” on how to improve different aspects of my work. I feel this has helped me grow as a researcher. Applying for the CACR Graduate Scholarship was just as easy! I am honored to be able to contribute to such an outstanding organization. I encourage all graduate students who are part of the CACR to submit their abstracts to the CACR annual conference, what an honor it would be for you to be nationally recognized and plus it looks good on your curriculum vitae!” - *Jonathan Silbermagel, Regina University; Masters Level CACR Graduate Award Winner 2013*

Abstracts & Student Award Application: <http://www.cacpr.ca/awards/CACRAwards.cfm>

Deadline for submissions: May 1, 2015

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