

Psychosocial Issues in Cardiac Prevention and Rehabilitation

“Psychosocial Issues” in Cardiovascular Rehabilitation (CR) 2015: Independent Cardiac Risk, Causal Mechanisms and Screening

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Psychosocial Issues (PI) are a Top Tier Cardiovascular Risk

INTERHEART¹ brought PI, often called stress, to the forefront of the CR world when psychosocial variables were found as strongly associated with having first heart attacks, as was cholesterol and smoking. What made this finding remarkable was the size of the association and that it emerged from a broad international context (of cardiovascular care in developed and developing countries).² Taken as a whole, distress accounted for a third of “population attributable risk”. Importantly, as the confounding effects of other risk factors were removed mathematically, the strength of the association between stress and cardiac events increased.

This result was entirely unexpected and required a companion article to elaborate the main finding.² Rosengren *et al* clarified that “stress” has many elements and the effects of stress are combinative. So clinically, a depressed patient who also has chronic stress (at home or work) has twice the cardiac risk of one without the chronic stress. On the other hand the presence of an “internal” locus of control can create resilience, decreasing total risk for others.

Prior to INTERHEART, an Australian Consensus panel³ completed an exhaustive review, concluding “*there is strong and consistent evidence of an independent causal association between depression, social isolation and lack of quality social support and the causes and prognosis of CHD*”, and that “*the increased risk contributed by these psychosocial factors is of similar order to the more conventional CHD risk factors such as smoking, dyslipidaemia and hypertension*” (p 272).³ The clinical message was that depression and social isolation both caused heart attacks and also protracted CR recovery. But what were the psychophysiological mechanisms that could account for these two (very different) psychosocial factors?

The excitement felt in the CR community a decade ago about including stress in risk management of cardiac patients was reflected in two featured articles in this journal (CV Edge).^{4,5} These findings had clear and profound clinical significance for how we treat CR patients. Clinically, best practice in CR means assessing a broad spectrum of psychosocial issues in our patients.⁶ However in the ten years since, there have been no updates in CV Edge. This article updates clinicians in how to identify CR patients with high risk features of the

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PI spectrum, their underlying physiological mechanism, and action to take for improving patient clinical outcomes.

A Spectrum of “Psychosocial Issues”

Stress is more than depression. A population-based study of community-dwelling adults⁷ (over 120,000 adults not selected for study because of illness) investigated whether psychological distress was independently associated with increased mortality. Across a four year follow-up period mortality for all-causes, not only cardiac, increased with distress in a dose dependent way. That meant that respondents who only had mild to moderate distress (who were well below the level characteristic of the clinically depressed) still had increased mortality risk.

Other reviews have also found that depression is not the only relevant factor predicting poor outcome. Denollet⁸ reviewed fifteen years of study with the Type D questionnaire, a measure of a general propensity to distress that is defined by a combination of negative affectivity and social inhibition.^{5,8} He reported that depression and psychological distress were found to be different from each other, each conferring different and independent cardiovascular effects. Psychological distress conferred a three-fold increase in the risk for adverse cardiac events.

Sleep disturbance is often assumed to be part of the symptom picture of depression, anxiety and distress. However, there are a number of sleep disturbances like obstructive sleep apnea⁹ and periodic limb movement disorder¹⁰, which have medical aetiology and have also been shown to increase cardiovascular risk.^{3,11} Insomnia is another factor contributing to cardiac risk.¹² The stress system has both a ‘daily’ function and an ‘emergency’ function: the daily function is entrainment of the body’s organ systems to the daily cycle of day and night, and the emergency function is to mobilize energy in response to danger.¹¹ Across the 24-hour period, epinephrine, cortisol, glucose, and insulin, exhibit rhythms that provide the body with sustained daily energy, while melatonin and growth hormone (released at night) orchestrate bodily recovery and repair. These cycling hormones contribute to orderly recurrent cycles that promote activity and rest. When these rhythms become destabilized this starts a vicious cycle (bad sleep, more stress, daytime fatigue, still worse sleep, depression, etc.) that undermines health and prolongs CR recovery.

Vagal Tone and Heart Health

Stephen Porges¹³ proposed that the ANS (which orchestrates the organism’s responses to the environment) has evolved three levels or circuits that are hierarchical, and interact to trigger nervous, hormonal and immune responses. The older two parts are primarily responsible for all defensive, life-saving

responses in emergencies.

The newest, the social engagement system, evolved when the vagus nerve developed a myelinated motor pathway to the cardiac pacemaker (the SA node). This allowed a new ability to inhibit heart beats, and added neural connections from the nucleus ambiguus to facial and neck muscles.¹⁴ These new face-heart connections formed the neurological circuitry supporting expressive facial gestures, vocalization and visual connection with mother, and provided the foundation for bonding with caregivers and for developing strong social connections. The new system created the circuitry to foster calm behavioral states by inhibiting sympathetic influences to the heart, dampening HPA axis activity and cortisol secretion, as well as the conditions for social engagement and the enhancement of emotional self-regulation to occur.

Under conditions of safety these circuits are engaged and vagal tone is cardio-protective; but when recent life events, current life context, or unexpected health events overpower safety, the autonomic system is vulnerable to hyperarousal and dysregulation, and will revert to the older defense systems, triggering fear, frustration, anger and social withdrawal.¹⁵ What drives safety is ‘*neuroception*’, the organism’s unconscious and automatic processing of current environmental risks as dangerous, or life threatening. The occurrence of recent major life stresses will prime the defensive system, as will chronic stress at work or at home.¹⁴ Moreover, this happens even if the person feels that they are dealing well with those stresses.

However, the environment is not the only trigger that drives the defense system. Afferent feedback from the soma, particularly the heart, to the insula maintain hyperarousal and emotional responses like anger, fear and sadness and shut down prosocial circuits that drive social engagement and inhibit sympathetic arousal. Autonomic dysregulation shuts down availability of social engagement circuits -- the perception of danger causes the individual to withdraw from social interactions.

Heart Rate Variability: a Biomarker for PI

A healthy person who has a strong social support network is more likely to have high vagal tone. High vagal tone is a physiological measure, or “biomarker” of the health of the heart. High vagal tone is evident from more variability from one beat to the next, i.e. high heart rate variability (HRV). For a decade now HRV has been proposed as a measure of cardiovascular health.¹⁶

Thayer *et al*¹⁷ presented a review of the evidence relating HRV to cardiovascular risk. They concluded that: 1) decreased vagal function is an independent risk factor for all-cause mortality, 2) decreased HRV characterizes all of the emerging psychosocial stresses (see ‘Spectrum’ above), 3) decreased

HRV is also associated with all the other known cardiac risk factors (cholesterol, smoking, obesity, hypertension, diabetes, and physical inactivity), and 4) treatments that specifically target increasing HRV are expected to be most beneficial to CR outcome, and have been found to be more related to self-rated health status than all other biomarkers.¹⁸

Treating PI for Better Outcomes

Nolan *et al*¹⁹ reviewed the impact of drug, biobehavioral and exercise therapies on HRV in cardiac patients, and concluded that all three increased HRV moderately (15.9%). Increasing HRV is also consistent with an earlier

meta-analysis on psychological treatment that concluded that stress management treatment only reduces mortality risks if the treatment actually reduces their physiological distress.²⁰ Recent studies of neuroscience(Polyvagal)-based²¹ and HRV-Biofeedback approaches show promising results for heart disease²² and CHF²³.

Screening: Psychosocial risks have to be identified before any clinical action can be taken.^{4,6,11} An evidence-based screener based on studies reviewed above is available at www.cardiaccollege.ca/EN/Wellbeing/



Dr Warner Mampuya, MD PhD FRCPC

From the Editor

Spring has finally arrived! No one complains anymore about the harsh winter full of stress and problems, as the spring is a good time to rest and relax. Now is the ideal moment to discuss the impact of psychosocial problems in cardiac rehabilitation.

Increasing number of studies demonstrate the importance of integrating psychological interventions into cardiac rehabilitation. Recent studies have shown the correlation between cardiovascular diseases and emotional states such as stress, anxiety, depression and anger.

A significant number of cardiac patients present emotional problems that predispose them to unfavorable medical evolution.

Incorporating psychosocial interventions into cardiac could have a positive influence on compliance and other cardiovascular risk factors.

The Canadian guidelines for cardiac rehabilitation and prevention specify the importance of detection, evaluation, and management of psychosocial problems in cardiac patients.

In this bulletin's first article, Prof. Jaan Reitav speaks about the psychosocial problems that constitute an important cardiovascular risk factor. This article will lead to a deeper discussion on the screening and management of psychosocial problems in the next CACPR meeting in October 2015 in Toronto, and please feel welcome to join our next meeting!

THIS PROFILE IS A STARTING POINT FOR BETTER DIALOGUE AND PLANNING WITH YOUR DOCTORS

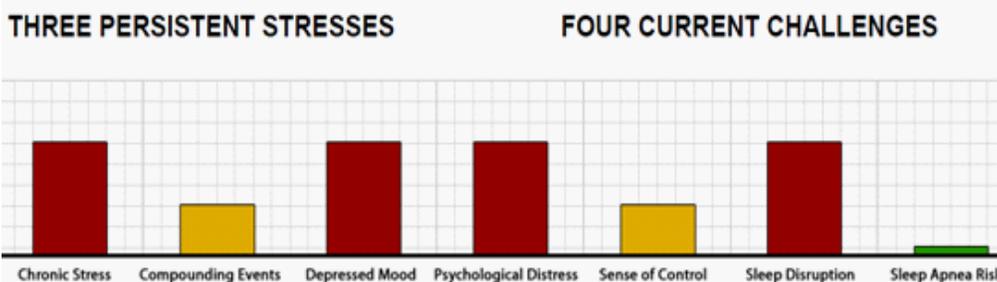


Figure 1: Heart Stress Risk Profile

The profile shows whether the seven PI risks are low (low green bars), moderate (middle yellow bars), or high (tall red bars). All seven screens use the actual questions that medical researchers have empirically validated as relating to increased cardiac risk. Four measures (CS, CE, DM and SC) are from INTERHEART^{1,2}; three others (PD^{7,24}, SD¹², and SA^{11,25}) from more recent studies. More information on using and interpreting the measures is available from Dr. Reitav.

Conclusions: PI exist on a spectrum and represent a top tier cardiac risk. Effective management in CR includes early screening, active education, and intervention targeting all current risks. Further discussion of screening and treatment for CR patients with PI risks is planned for the upcoming CACPR

Conference in October 2015.

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The second article presents an interesting point of view on the nudge theory. This theory is defined as a moderate, soft and non-invasive version of paternalism. Its purpose is to gently push in the right direction. According to Marc S. Mitchell and colleagues, when applied to cardiac rehabilitation, the nudge theory is a philosophical approach that aims to help our patients make decisions that would improve their life with no excessive limits or restrictions attached.

In the Research Progress section, Heather Tulloch et al give us an introduction of their research project on the use of cognitive rehabilitation as an essential complement to cardiac rehabilitation in patients with cognitive problems, more precisely those who survived a cardiac arrest outside the hospital. The authors suggest that the use of cognitive rehabilitation could have important impact on the function and quality of life of these patients.

We also present a review of two recent articles on the management of psychosocial aspects in cardiac rehabilitation. The first article is on the position of the European Society of Cardiology on the evaluation and the management of psychosocial problems in cardiac rehabilitation. It is a very thorough document that should be read by everybody interested in psychosocial issues in cardiac rehabilitation.

The other article addresses the great uncertainty that a patient with an implantable defibrillator can experience. In this article, we find useful tools to be able to help those patients.

Finally, in the Program Profile section, Holly Wykes presents Good-Life Fitness, a cardiovascular rehabilitation and prevention program that offers a unique service to patients with congenital heart disease and puts a great emphasis on their psychosocial well being.

We would like to thank all the authors who contributed to this bulletin, and we would like to invite those who are willing to contribute to contact us for further discussion. Our next bulletin will be on cardiac rehabilitation in heart failure.

Enjoy spring!

Nudge Theory Uncovers New Opportunities In Cardiac Rehabilitation

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Abstract

Cardiac rehabilitation (CR) programs reduce costly re-hospitalizations and all-cause mortality. Participation rates are disappointingly low, however, limiting returns on investment. The purpose of this commentary is to introduce the concept of nudge theory and speculate on its possible application within the CR context. Although well meaning, we argue that CR programs may not always be structured in ways that facilitate health behaviour change. We deploy nudge theory to help to frame this argument. In particular, we draw attention to how “choice architecture” (that is, the deliberate design of the CR “choice environment”) and acknowledgement of predictable “decision biases” (systematic biases in human judgement that make it hard for people to make healthy choices) may help address the persistent issue of sub-optimal CR program participation.

Keywords: Cardiac rehabilitation, behavioural economics, patient engagement

Introduction

Cardiac rehabilitation (CR) program participants are less likely to be hospitalized, and more likely to live longer than non-participants.¹⁻³ CR is a cost-effective health intervention as well.⁴ Despite the health and economic benefits, CR programs have consistently struggled to optimize participation rates. Sub-optimal program attendance, for example, has been limiting program impact for years. According to a large retrospective analysis (n=12,440), 22% of patients drop-out of CR even though each 10% increase in program attendance is associated with a 4% decrease in predicted probability of death or hospitalization.⁵ In addition, according to the same analysis, among ‘completers’ mean program attendance is 71%,⁵ suggesting that many participants are not reaping all the purported benefits of full CR participation. Poor post-CR compliance is a major issue as well, with up to 83% of CR graduates discontinuing their exercise regimen within two years.⁶ A short course of CR is inadequate, it has been written, and leads to increased cardiovascular risk, if it is not accompanied by long-term exercise adherence.⁷ Exercise maintenance is critical if the “pathological atherosclerotic milieu”⁸ (p. E2) that is a characteristic of the physiology of many CR participants and graduates is to be optimally managed. The purpose of this commentary, therefore, is to introduce the concept of behavioural “nudge theory” and speculate on its possible application within the CR context. We have been engaged in research on using incentives (a type of nudge) to promote exercise

adherence and some examples of this work will be shared to illustrate key points. Given the importance of adherence in CR we suggest much might be learned from nudge theory.

Nudge theory

The reasons for CR program effectiveness and cost-effectiveness are many and varied and include an appropriate emphasis on regular exercise, a multi-disciplinary approach to CVD risk reduction, and evolving delivery models to satisfy changing landscapes (e.g., home-based CR for working adults). Another less obvious reason for CR program effectiveness may have to do with the ‘design’ of the CR program environment – specifically the impact of subtle, maybe inadvertent, design decisions on program effectiveness. Environmental design, it turns out, can have a significant impact on human decision-making. Design can refer to almost anything, including the physical positioning of people or items (e.g., stairs or hand sanitizing stations), the way key messages are framed (i.e. positively or negatively), or the effort required on the part of an individual to accomplish health-related tasks. In a 2008 book entitled, *Nudge: Improving decisions about health, wealth, and happiness*, behavioural economists Richard Thaler and Cass Sunstein coined the term “choice architecture” to describe the process whereby environments can be designed to facilitate healthy choices.

Thaler & Sunstein (2008) wrote that a nudge is “...any aspect of the choice architecture that alters peoples’ behaviours in a predictable way...”⁹. The classic example in the health domain has to do with the design of cafeterias – that is, the strategic placement and presentation of healthy foods in cafeterias to promote healthy food choices. Setting up the salad bar at the cafeteria entrance increased healthy food sales by 18% in a recent example.¹⁰ The *Nudge* authors argued that if cafeterias could be deliberately designed to promote healthy food choices then shouldn’t we at least try to create environments that facilitate other self-beneficial choices? Evidence from nudge-inspired policies in government and corporate settings globally suggest that the answer to this question is a resounding ‘yes’ and Dolan et al. (2010) provide a useful summary of nudge-inspired public policies.¹¹

Behavioural economics (also known as nudge theory), a new branch of economics complemented by insights from psychology, also acknowledges that human judgments are biased in systematic ways, and that these decision biases can make it difficult for people to

make rational, self-beneficial choices.¹² For example, “present bias” refers to the tendency to act in favour of one’s immediate self-interest at the expense of one’s long-term wellbeing. In the case of exercise, the “costs” (e.g., time, uncomfortable feelings) are outweighed and experienced in the present while the benefits (e.g., health, longevity) are discounted and delayed which often results in notorious resolutions to “exercise more tomorrow”.¹³ Other nudge theory decision biases include (1) “loss aversion” (i.e. losses loom larger than equivalent gains), “probability weighing” (i.e. people think they have a better chance of winning lotteries than they actually do), and “default bias” (i.e. people tend to favour the ‘default’ choice, or status quo). The “default bias” can be an extremely valuable target for intervention since people habitually, and predictably, go along with pre-determined choices. The problem of low organ donation rates in the U.S. provides one of the best examples of how “default bias” can be exploited for the greater good. According to Johnson (2003), the current opt-in organ donation system in the U.S., where citizens are free to actively register to become organ donors, is limiting donation rates. Johnson (2003) suggests that an opt-out procedure, where individuals are automatically registered to donate their organs (the ‘default’) but are free to opt-out at any time, may boost organ donations, citing research that suggests that an opt-out system could double donation rates.¹⁴ The question remains, can nudge interventions, such as the ones in the cafeteria and organ donation examples, be used to correct predictable decision biases in CR as well? An examination of concrete examples drawn from the University Health Network’s (UHN) Cardiovascular Prevention and Rehabilitation Program, one of the largest publicly funded CR programs in Canada, may help reveal the potential application of nudge theory in the CR context.

Nudges in CR

As a first example, the familiar exercise diary (i.e. a weekly exercise tracking tool) has been a fixture of the UHN program for many years – and for good reason, as exercise self-monitoring has proved to be the factor most closely associated with regular exercise. We would argue that exercise diaries in and of themselves may be insufficient to support regular exercise, however – but rather, a ‘user friendly’ environment that encourages their regular use may be the critical factor. At UHN patients hand-in their diaries upon entering the building, and are usually greeted by a volunteer who accepts and files the diaries, which sends the implicit message that the diary is important. As well, when a patient sees her peers submitting an exercise diary the “herd mentality” described in nudge theory kicks in, where patients want to do as their counterparts do.¹² Similarly, at UHN, patients are asked to report their exercise ‘data’ (e.g., time, distance, heart rate) upon completion of their on-site exercise session which serves the dual purpose of ensuring patients adhere to the “FITT” parameters of their exercise prescription, but

also, perhaps unknowingly, affords patients the chance to receive immediate and positive feedback from a trusted health provider, another key nudge theory principle.¹² Regular feedback is especially important for ‘lifestyle’ health behaviours that need to occur almost daily but whose benefits are hard to quantify.

Another example has to do with information communicated via electronic message boards scattered throughout the UHN facility. One screen in particular (the very visible one hanging over the indoor walking track) (see Photo 1) advertises the number of graduated patients since 1998 – over 28,000. The implicit message here, which may be a very effective if not an inadvertent motivator, appeals to the “herd mentality” as well and very subtly applies normative pressure to optimize program participation. The strength of this message is offset, however, by the limited usefulness of the scrolling text right next to it (on the same screen), which usually features interesting facts about health in general. Offering and properly framing information about peer behaviours, for example, may prove to be a more useful use of the space. For example, it may be better to inform participants that 8 out of 10 of their peers submit weekly exercise diaries. This approach was successfully deployed in 2010 by the U.K. government in their effort to collect outstanding taxes. Compared to a standard letter, they found that appealing to local norms increased their collections rate by 15% (i.e. “8 out of 10 Britons pay their taxes on time” vs. “8 out of 10 people in your neighbourhood pay their taxes on time”).



Photo 1. Electronic message board at the University Health Network (Rumsey Center).

However well intentioned, CR programs may not always be structured in ways that make healthy choices the easiest choices for patients. Next are a few more examples of how aspects of the UHN environment

could be altered to exploit systematic decision biases UHN offers free, annual fitness assessments every year after CR program completion, but less than 1% of graduates take advantage of the opportunity. While

many graduates may like to return to the center for the so-called 'Pulse Check', actions too often do not match intentions. According to nudge theory, changing the default choice in this situation, where patients, for example, are automatically booked for a 'Pulse Check' at graduation and have the option of opting-out of the assessment if they want to, may increase the proportion of people returning for a follow-up assessment (i.e. the 'dentist appointment' model) and coincidentally maintaining their exercise program over the course of the year. To minimize the resource strain of a sudden jump in 'Pulse Check' usage, the 'dentist appointment' model could be offered to the patients at highest-risk of recurrent morbidity only (e.g., those with aerobic fitness under a certain threshold).

Co-payments, the requirement for patients to pay for a portion of elements of their health care, have consistently been shown to reduce adherence to physician recommended health interventions (e.g., medication adherence decreases as co-pays increase).¹⁵ The same is likely true for CR program costs. Unfortunately, UHN has had to recently increase parking rates for patients by 300% (from \$70 to \$208), which may limit program engagement, especially amongst the lowest income participants. Insight from nudge theory may help to address this ascending issue. For example, nudge describes how losses loom larger than equivalent gains ("loss aversion"). With this in mind, and to help offset the rising cost of parking, UHN could offer a 'deposit contract' parking program where patients pay \$50 to participate, with the opportunity to earn their \$50 back (plus an extra \$50; \$100 total) if they attend 70% of the pre-scheduled sessions. This strategy could at once serve to lower an economic barrier and motivate fuller CR participation. The cost of the parking reimbursement program could be covered in part by the 'extra' money patients pay to participate in the program (i.e. those who fail to reach the threshold level of attendance essentially donate their \$50 to the program). To put this into practice, coordinating different areas of the organization to support a patient model of care would be required.

Financial incentives such as the 'deposit contract' may have a role to play in promoting post-CR exercise as well. As mentioned, upwards of 83% of CR graduates discontinue their exercise. According to nudge theory, increasing the immediately rewarding aspects of exercise during the difficult transition to community-based exercise may correct the "present bias", and increase graduate's propensity to maintain their exercise. Data from a recent feasibility RCT we conducted at UHN suggests that incentives may support the difficult transition to independent exercise and are associated with aerobic fitness maintenance. Notably, our data suggest that incentives did not undermine intrinsic motivation to exercise, an often-cited threat of incentive intervention.

A new partnership between UHN and *GoodLife Fitness* may be leveraged to deploy incentives in a way that promotes post-program gym attendance as well. Currently, *GoodLife* is offering all UHN graduates a free 3-month membership (worth about \$180).¹⁶ Nudge theory would suggest that a contingency contract (or "pre-commitment") may boost gym attendance and promote long-term exercise adherence and gym membership more so than a short-term subsidy – for example, offering \$15 monthly re-imbursements (for a year) to those who swipe in at the gym at least eight times per month. This arrangement would be cost-neutral, has worked well in Canada the past,¹⁷ and is more likely to drive sustained, community-based exercise in this population. Of course, this approach would need to be empirically tested in the current context (i.e. subsidy vs. contingency), and logistical issues would need to be addressed.

Conclusion

By acknowledging psychological tendencies that underlie decision-making, nudge theory offers a descriptively accurate portrait of human behaviour and is thus a strong theoretic foundation from which to generate practical techniques for promoting behaviour change. Given the gap between people's intentions and their actions, nudge principles may have a role to play in helping people follow through on their best intentions. In conclusion, nudge theory provides a sort of call to action for Canadian CR programs. With more deliberate "choice architecture", CR programs may be able to pave the path of least resistance, shifting the focus from education, and motivation, to facilitation. If even subtle changes to the choice environment can make CR adherence easier, then nudge theory, may have a useful role to play in informing optimal CR program design and delivery.

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Call for CACPR's CCRR Director

5 Year Term - Starting September 1st, 2015 Volunteer Position

Roles

- Develop strategic direction for the CCRR
- Define policies and procedures for CCRR in consultation with CACPR and the sub-committees
- Lead stakeholder engagement, including sponsors (current and new), linking with partner organisations, seeking collaborative opportunities
- Provide support to provincial organisations
- Champion the importance of quality monitoring and registries
- Chair the CCRR Executive committee
- Support the work of the liaison and research sub-committees
- Presentations at the annual meeting and with partner organisations
- Represent the CCRR to the CACPR board

Qualifications and skills

- Experience within a Cardiac rehab programme (knowing how programmes run)
- Passionate about the value of information in the context of care
- General management experience
- Experience with engaging stakeholders, e.g., pharmaceutical companies and other aligned organisations.
-

If you are interested in the the volunteer position please send a Letter of Interest and your CV to Linda Smith, Executive Director at lsmith@cacpr.ca, no later than August 1st, 2015.

Research in progress

Is It Time for Cognitive Rehabilitation in Cardiac Rehabilitation?

Heather Tulloch, Ph.D., C. Psych University of Ottawa Heart Institute, 40 Ruskin Street, Ottawa, ON

Barbara Collins, Ph.D., C. Psych The Ottawa Hospital – Civic Campus, 1053 Carling Avenue, Ottawa, ON

Mr. M is a 50-something cardiac arrest survivor who was treated with therapeutic hypothermia to protect neurological functioning. After regaining consciousness, he appeared to make a good neurological and cardiac recovery. He completed cardiac rehabilitation without difficulty, except that he often asked the same questions and seemed to be more “emotional” than usual. After 4 months, he attempted to return to work reviewing policies for the Federal Government; that is when the problems became evident. He had difficulties with concentration and memory, and was not able to complete his tasks in a timely manner. As he had always been a hard worker and held himself to a high level of productivity, he experienced depressive symptoms and reported poor quality of life. He was therefore referred to Psychology for assessment. It is cases like these that spurred a new area of research at the University of Ottawa Heart Institute (UOHI).

BACKGROUND: Neurological Effects of Cardiac Arrest

Approximately 40,000 Canadians suffer a cardiac arrest each year and half of these occur outside of hospital¹. Improvements in resuscitation and life support technology (e.g., automated external defibrillators) have resulted in up to 5-fold increases in survival rates following out-of-hospital cardiac arrest (OHCA).² However, cardiac arrest and resuscitation are associated with significant, and sometimes permanent, morbidity. Due to its high metabolic demands, the brain is particularly vulnerable to oxygen deprivation; 4 to 5 minutes of absent cerebral blood flow is sufficient to result in neuronal death. Long-term neurological outcome among OHCA survivors is generally regarded as bimodal; approximately 25% are rendered completely dependent by severe physical and mental deficits and the remaining 75% are characterized as having a good functional outcome.³ However, this is a very coarse classification that does not take mild-to-moderate disturbances of cognitive function into account. Studies that have used more sensitive neuropsychological testing batteries suggest that 50% or more of survivors have mild to moderate cognitive impairment.⁴ However, these estimates are highly unreliable because the few existing studies are small and suffer from serious methodological weaknesses (e.g., inadequate sensitivity of cognitive measures, retrospective designs, failure to account for confounding factors).⁵ A well-designed large-scale prospective longitudinal study in “good outcome” OHCA patients is required to determine the true scope

and impact of cognitive dysfunction in this population.

Impact and Moderators of Cognitive Dysfunction in OHCA Survivors.

Research in other clinical populations (e.g., mild traumatic brain injury, cancer) has clearly demonstrated that even relatively mild cognitive deficits can have important implications for functioning and quality of life. However, data on this issue in OHCA patients are limited and generally indirect. One proxy measure of functioning is return to work: Studies suggest that only between 20-30% of “good outcome” OHCA survivors regain their pre-arrest employment status^{6,7}. The functional impact of OHCA-related cognitive dysfunction may be moderated by employment status due to the greater cognitive demands for patients returning to work. Depression and anxiety may also moderate the relationship between cognitive status and functional capacity, in that anxiety and depression can adversely affect cognitive function in and of themselves and have been shown to be significant prognostic factors in a variety of medical conditions.⁸ Although several studies have addressed quality of life in OHCA survivors, very few specifically address the relationship between neuropsychological performance and quality of life. Yet, cases like Mr. M call for such investigations. Further research is warranted to better understand the impact and potential moderators of cognitive problems in “good outcome” OHCA survivors, and to determine the need for cognitive rehabilitation interventions.

Cognitive Rehabilitation

Cognitive rehabilitation has proven effective at enhancing functional outcomes in many patient groups.⁹ It may be an important adjunct to cardiac rehabilitation for OHCA survivors but, to date, there are no data concerning cognitive intervention in this setting. In order for a cognitive intervention to be effective, it should be based on the cognitive strengths and weaknesses in the target population. Thus far, the neuropsychological profile in “good outcome” OHCA survivors has not been well characterized. In a retrospective chart review of 38 OHCA patients who underwent neuropsychological assessment, we found that memory and executive function were the domains that showed the greatest impairment, in 67% and 94% of cases, respectively. However, more systematic research is needed to identify the key domains of cognitive impairment to be targeted in interventions for the OHCA population.

CURRENT RESEARCH

We are undertaking a study with OHCA survivors (projected N=78) hospitalized at the UOHI. The purposes of the study are to: 1) determine the frequency of cognitive dysfunction; 2) characterize the neuropsychological profile; and 3) evaluate the impact of long-term cognitive sequelae on function and quality of life. Participants undergo a neuropsychological assessment battery prior to discharge (T1) and 12 months post-discharge (T2). Clinical, demographic, mood, functional status, social support, occupation, and quality of life measures are also collected at both time points. We will determine the percentage of impaired OHCA patients and compare this to a normative sample as well as to patients having experienced a myocardial infarction. We will also examine which cognitive domains are most affected. Finally, we will evaluate if social support, employment status and/or mood moderate the cognitive dysfunction and quality of life relationship.

Significance of this Research

At present, most OHCA survivors do not receive any form of cognitive assessment or rehabilitation. We consider this to be a serious gap in the current standard of care for these patients. We intend to use the results from this study to develop practice guidelines for the assessment and treatment of cognitive dysfunction in OHCA survivors and to develop accessible and appropriate cognitive interventions that can be incorporated into traditional cardiac rehabilitation programs. We anticipate that improved detection and treatment of cognitive sequelae will reduce chronic disability among OHCA survivors and enhance their day-to-day function and quality of life.

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References and Review

Kelly Angevaare, RKin, MSc, ACSM-RCEP
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Psychosocial aspects in cardiac rehabilitation: From theory to practice. A position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation of the European Society of Cardiology.

Pogosova N, Saner H, Pedersen SS, et al. Eur J Prev Cardiol. 2014 Jul 24. pii: 2047487314543075. [Epub ahead of print]

Psychosocial stressors are known to contribute to an increased risk of cardiovascular events and impact

prognosis. Progress made within cardiovascular rehabilitation (CR) programs can also be affected when psychosocial risk factors (PSRFs) are present. This position paper highlights the importance of identifying and managing PSRFs while participating in CR programs.

PSRFs can include both psychological characteristics (e.g., depression, anxiety) and psychological processes that stem from interactions between an individual and his or her environment (e.g., social support). The authors remind CR professionals that “stress” encompasses specific situations or events as well as the stress response or presenting symptoms, and that both should be considered when discussing with CR participants. Furthermore, health-related quality of life is an important CR outcome recommended for monitoring throughout a participant’s program given the evi-

dence for its significant relationship with PSRFs. The paper advocates well for conducting PSRF screening in CR programs, and having at least one staff member trained to do so. A list of suggested screening questions to assist program staff in identifying potential PSRFs is provided. Suggested services for CR programs to offer include individual or group-based stress management, vocational counseling, and referrals to psychiatric or behavioural therapy.

This paper argues and provides extensive evidence for PSRF screening in CR programs. Although the authors have chosen to focus only on patients with uncomplicated CHD, other populations served within CR (e.g., heart failure, stroke) would arguably benefit from PSRF screening as well. Training CR staff and securing supportive resources and partnerships with appropriate health professionals are necessary if CR programs are to include PSRF screening as a standard of practice.

Living with an implantable cardiac defibrillator: a model of chronic uncertainty.

Carroll SL, McGillion M, & Arthur HM. Res Theory Nurs Pract. 2014; 28:71-86.

Increasingly more implantable cardiac defibrillators (ICDs) are being implanted for primary or secondary prevention of life threatening arrhythmias and sudden cardiac arrest. Patient adjustment to living with an ICD can be characterized by uncertainty, which as the authors explain, occurs when meaning behind an

illness cannot be grasped. The uncertainty in illness model explores the antecedents, appraisal, and coping mechanisms related to acute uncertainty. Recognizing that patient adjustment following ICD implantation can be an ongoing and variable process, this paper aims to expand the uncertainty in illness model to include situational factors, personality, and social support that could impact chronic uncertainty within this population.

Prospective randomized and unrandomized trials as well as qualitative studies were included in the literature review. Factors found to impact long-term adjustment include the ongoing fear of receiving ICD shocks and not knowing when or where it could occur, particularly if the patient has never experienced a shock previously. Safety concerns related to exercise and driving can also be present. An increased prevalence of anxiety or depression pre-ICD implantation may translate to more difficulty in addressing uncertainty post-implantation. Informational support is found to benefit some patients, while others require more emotional support.

Uncertainty in illness may be present months to years post-ICD implantation. It cannot be assumed that all ICD patients are similar, as their pattern of adjustment can vary over time and can also depend on ICD indication (i.e., primary versus secondary prevention). The proposed expanded model alerts health professionals to chronic uncertainty and varying patterns of adjustment to consider when determining support needed for patients living with an ICD.

Program Profile

Cardiac Rehabilitation for Adult Congenital Heart Disease: Strengthening Body, Mind and Spirit

Holly Wykes, R. Kin., M.Sc. Candidate, ACSM Certified Clinical Exercise Physiologist®
UHN Cardiovascular Prevention & Rehabilitation Program
Toronto Western Hospital – GoodLife Fitness Cardiovascular Unit Toronto, Ontario

Adult congenital heart disease (ACHD) affects one out of every 100 babies born in Canada, making it one of the most commonly diagnosed birth defects.¹ Thanks to advances in detection, interventional treatment, and long term management, today more than 85% of those born with ACHD can expect to live to adulthood.² This population faces complex comorbidities throughout the lifespan, including arrhythmias, susceptibility to endocarditis, and an increased risk of TIA.¹ Long term consequences of ACHD, including pulmonary hypertension, heart failure, and low functional capacity pose added complexity to an already susceptible patient group.¹ An estimated 20 to 30% of those with ACHD have other physical, developmental, or cognitive disorders along with the fundamental cardiac pathology, underlying the need for interdisciplinary care and management.^{1,2}

Few studies have examined guidelines for safe exercise in the ACHD patient, resulting in a population afflicted by low exercise capacity, sedentary behaviour, obesity, and psychosocial distress.^{1,3} With this population now facing a longer lifespan, the focus of care is shifting from one of preventing morbidity in infancy and childhood, to focusing on autonomy, psychosocial factors, and physical considerations in adulthood.² Currently, no formal exercise guidelines exist for the ACHD population,⁴ and consequently, exercise is currently formally prescribed for only 19% of patients living with ACHD.¹ A number of studies to date have looked at the effectiveness of different training protocols on various patient populations, eliciting promising improvements in quality of life, peak exercise capacity (VO₂ peak), exercise duration, and reduced symptoms of anxiety.⁵⁻⁶ These benefits have also been demonstrated without

increased risk in morbidity or mortality among exercising patients.⁵⁻⁶ Research suggests that enrolment in cardiac rehabilitation programs is beneficial to patients with ACHD, allowing patients the opportunity to improve exercise capacity, manage cardiovascular symptoms, and enhance quality of life.⁷

Cardiac rehabilitation is defined as “the enhancement and maintenance of cardiovascular health through individualized programs designed to optimize physical, psychological, social, vocational, and emotional status.”⁸ At Toronto Western Hospital, the UHN Cardiovascular Prevention and Rehabilitation Program – GoodLife Fitness Cardiovascular Unit (see



Figure 1. GoodLife Fitness Cardiovascular Unit – Toronto Western Hospital (2014)

Figure 1) offers a unique partnership between ACHD inpatient care and outpatient rehabilitation. Part of the Peter Munk Cardiac Centre, and led by Holly Wykes, Registered Kinesiologist, this program stream caters to patients with ACHD by providing a dedicated staff member to liaise with members of the interdisciplinary care team, and advocate for the patient. All participants are enrolled in a 16-week, three step program that consists of:

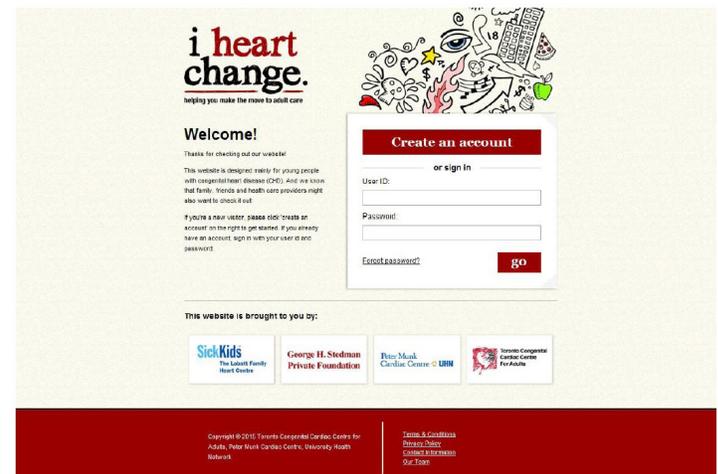
1. Early education
2. Individualized assessment
3. Supervised group exercise classes

Other disciplines available to the patient include Registered Nurses, Registered Dietitians, Exercise Physiologists, Pharmacists, Physicians and Cardiologists, working together to address specific needs and goals for each patient.

The message provided in cardiac rehabilitation is, “Exercise is Medicine”. Participants learn that while medications, doctor appointments, and regular testing and evaluation are critical, the patient can also take an active role in managing his/her condition. The program emphasizes a healthy diet, living smoke-free, and managing stress, and uses exercise as a vital tool to help patients reach their goals. By offering individualized

assessment and risk stratification, personalized goal setting, and customized exercise prescription (see *Table 1 next page*), and following best practice guidelines (see *Table 2 next page*), patients follow a progressive plan exercising twice per week for four months under supervision.⁹ Patients are closely monitored for signs and symptoms of maladaptation, including desaturation, syncope, changes in blood pressure, or new or worsening arrhythmias, with changes in status communicated directly to the referring Physician. At the end of the program, there is a graduation class for all participants, and patients are ready to integrate their

Figure 2 – I Heart Change obtained from www.iheartchange.org (2015)



new regime into their daily life at home and in the community. The support from Goodlife Fitness continues for graduates of the program who wish to keep up their regular workouts at one of their gyms by offering them a discount on their membership along with a three-month trial pass.

To address patients’ psychosocial well-being, referrals are available to mental health professionals at University Health Network. I Heart Change (see Figure 2) is a website developed by the Sick Kids Labatt Family Heart Centre, the George H. Stedman Private Foundation, Peter Munk Cardiac Centre, and the Toronto Congenital Cardiac Centre for Adults. It is a comprehensive website designed to assist youth with the transition from paediatric care to adult care with a focus on self-management, and the importance of long term ongoing care.¹⁰ To address psychosocial considerations, the program works closely with Dr. Adrienne Kovacs, Clinical Psychologist at Toronto General Hospital. Dr. Kovacs provides cardiac psychology services, including psychotherapy, which is offered to patients whose cardiac condition is affecting their quality of life. Patients can be referred to this service from a Cardiologist or directly from the cardiac rehabilitation program. This treatment focuses on stress management and coping strategies.

To conclude, exercise is relatively safe and should be encouraged in all patients with ACHD, with a focus to-

wards the specific electrophysiological and haemodynamic considerations, rather than the underlying cardiac lesion itself. Graded exercise testing is recommended prior to commencing an exercise regime to determine physiological responses to exercise, assess current fitness level, identify any considerations, and prescribe a target exercise range. An interdisciplinary team is best suited to care for the patient with ACHD, providing access to necessary resources including nutrition, stress management, vocational needs, and medical care. Finally, ongoing follow-up and re-evaluation is required with any change in status to determine ongoing safety and efficacy of the cardiac rehabilitation program.

Table 1. FITT Principle for Exercise Prescription (Adapted and modified from Pescatello, 2014)

	Aerobic Exercise	Resistance Exercise	Flexibility
Frequency	5-7 days/week	2-3 days/ week	Daily
Intensity	Moderate	Light-Moderate	Light
Time	30-60 Minutes/day	20-30 minutes/ day	10 minutes/ day
Type	Walking, Cycling	Therabands, Weights	Stretching, Yoga

Table 2. Special Considerations for Exercise with ACHD (adapted and modified from Gatzoulis et al, 2005)

Exercise Contraindicated	Class 1A Activities	No Restrictions
<ul style="list-style-type: none"> Severe pulmonary hypertension Cardiomegaly Eisenmenger physiology Malignant arrhythmias Class IV symptoms 	<ul style="list-style-type: none"> Left-right shunting and some degree of pulmonary hypertension or cardiomegaly Moderate to severe obstructive lesions (Coarctation of the Aorta) Clinically stable repaired Tetralogy of Fallot, Mustard procedure, arterial switch, Ebstein's anomaly and Fontan operation 	<ul style="list-style-type: none"> Left-right shunting lesions with normal pulmonary pressures and no cardiomegaly (VSD, ASD or repaired, repaired Tetralogy of Fallot) Mild right or left-sided obstructive lesions (mild pulmonary stenosis, mild aortic stenosis or mild Coarctation of the Aorta)

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From the Office

Spring is finally here and we all look forward to renewal and new beginnings at CACPR. As your new Executive Director, I am looking forward to all of the exciting opportunities we have before us. I have a deep appreciation and understanding about the importance of membership – and that members are the backbone of a successful, thriving association. The members I have met so far are certainly dedicated, energized and committed to CACPR's mandate of being a national leader in clinical practice, research and advocacy in cardiovascular disease prevention and rehabilitation.

New to the staff team as well, is Sheena Dayman, Administrative Assistant /Membership Coordinator. She is filling in for Leanne Lemieux, who is on a leave. Sheena brings a strong background in marketing, administration and web design and is a welcome addition to the staff team.

Over the coming year it is our intention to provide more tools, more cost savings programs, more webinars, more peer contact and more individual support to add value to your CACPR membership experience. We are looking for ways to expand our social media strategy to better connect and inform the membership

about issues that shape the cardiovascular prevention and rehabilitation landscape. As a first step to that end, please like us on Facebook.

As well, it is never too early to mark your calendars for the CACPR Annual Symposium and Conference on October 23rd – 25th, 2015 in Toronto. The Conference Planning Committee is working tirelessly towards making this event the very best educational and networking experience it can be and more information will be released shortly.

Finally, it is the volunteer committee work that drives the efforts of CACPR. If you are interested in joining one of our many committees, visit our website for a full list with terms of reference or contact us at the CACPR office.

Regards,



Linda Smith
Executive Director

Calls for the CACPR Annual Conference

Call for Leadership Awards

In recognition of the CACPR Membership, the Board of Directors would like to recognize an outstanding member of the Canadian Association of Cardiovascular Prevention and Rehabilitation. Nominees will have significantly advanced the field of cardiac rehabilitation and prevention through clinical practice, research, education and knowledge transfer, and/or advocacy. Please consider the efforts of your colleagues and nominate individuals who exhibit outstanding leadership or contributions to CACPR and/or cardiac rehabilitation locally, regionally, provincially, nationally and/or internationally. All nominees and nominators must be CACPR members. There will be one award in one of the following four categories:

- Clinical practice
- Research
- Education/Knowledge Transfer
- Advocacy

Fill out the form today for a fellow colleague! Self nominations will no longer be accepted for this award. Aug. 31st deadline.

<http://www.cacpr.ca/awards/LeadershipAwardApplication.cfm>

Call for Exhibitors

CACPR is looking for Exhibitors for the Toronto Conference this year. All applications will be reviewed by the CACPR and will be evaluated as to applicability to cardiac rehabilitation and prevention. Exhibitors deemed to be of most interest or most relevant to the CACPR members or activities, will be accepted for exhibiting in the CACPR Showcase. The accepted number will vary each year and is dependant upon available space in the current conference facility.

Contact Sheena Dayman at head office for application at admin@cacpr.ca

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