

Canadian Journal of
Cardiovascular Nursing
Revue canadienne de
Nursing cardiovasculaire



In this issue:

Focus on
women's health and
cardiovascular care

Dans cette édition:

Concentration
sur la santé des femmes et les
soins cardiovasculaires.



Canadian Journal of Cardiovascular Nursing

In this issue:

One Woman's Story

The story of one woman's struggle with heart disease.

L'histoire du combat d'une femme contre la maladie cardiaque.

Women's Experiences of Heart Surgery Recovery: A Poetical Dissemination

A poetical review of the literature on women's experiences of recovery from heart surgery.

Une revue poétique de la littérature sur l'expérience des femmes en période de réadaptation suite à une chirurgie cardiaque.

Gender of the Care Environment: Influence on Recovery in Women with Heart Disease

An exploration of the effect of a male treatment environment on sex differences in distress after a myocardial infarction.

Une exploration de l'effet d'un l'environnement principalement masculin entourant le traitement sur les différences liées au sexe dans la détresse après un événement cardiaque.

Women's Cardiac Rehabilitation: Improving Access Using Principles of Women's Health

A case study of a cardiac rehabilitation program in Toronto.

Une étude décrivant un programme de réadaptation cardiaque développé à Toronto.

Maternal Cardiac Autonomic Function and Fetal Heart Rate in Preeclamptic Compared to Normotensive Pregnancies

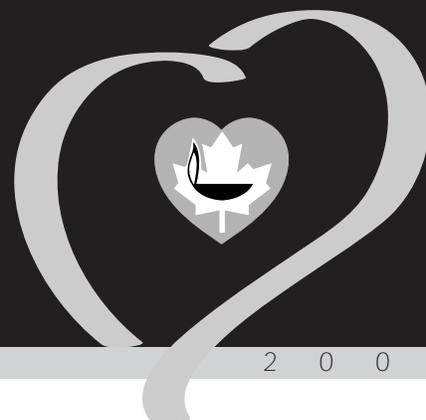
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Women's Health and Cardiovascular Care

Lynne E. Young, RN, PhD

Why this special issue of the **CJCN** on women's health and cardiovascular care? Cardiovascular disease (CVD) is traditionally understood as one that favours males. Not until the late 1980s was attention focused on women in the cardiovascular field, a gender bias that came to my attention when critiques revealed that cardiovascular research was conducted primarily on men and generalized to women. The lived reality of this bias hit home to me when faced with my mother's challenges with cardiovascular care. My mother, who was diagnosed with heart disease about 1970 at age 52, was challenged to balance dose, benefits and side effects of her pharmacological therapy. Reflecting on this challenge in light of my new-found awareness of cardiovascular science, I wondered how many women weighing in at 105 pounds were represented in cardiovascular drug trials. Then, my mother was charged with caring for my father throughout a lengthy disability, and it struck me that many women are faced with coping with heart disease while caring for a spouse similarly afflicted. As a nurse, it was revealing, often disturbing, to watch my mother cope with this "double whammy" with few focused resources to support her efforts to manage her CVD while caring for a disabled spouse. Thus, my understanding of the links between women's health and cardiovascular care was reframed as more than strengthening cardiovascular science. Rather, women's health and cardiovascular care shifted for me from a focus primarily on reducing the effects of, or eliminating CVD, to a focus primarily on the health of women, that is: women at risk for or with CVD, women caring for a loved one with CVD, and women with CVD who are primary caregivers of a loved one with CVD. In this collection, while we do not necessarily address all of these categories of women, we provide

ideas, information and strategies to support you, the reader, in thinking through the links between women's health and cardiovascular care. To that end, articles are included that derive from personal, practical, interpretive and aesthetic, theoretical and empirical knowing. Thus, in this one issue, multiple ways of knowing are recruited to advance knowledge development in the field.

Opening the issue is the story of one woman who describes the experience of living for more than a decade with cardiovascular disease: "Cardiovascular care and health: One woman's story". Attending to, and reflecting on this story has potential to raise readers' awareness of the impact of dominant perspectives on CVD care on nurses' relational encounters with women. For example, the author tells how difficult it is for her to convince nurses that she has CVD because she is petite and looks healthy and young for 50. Thus, one question CV nurses might ask arising from this story is: "In our practice as cardiovascular nurses, do our assumptions about who is at risk for CVD dominate communication with women patients, or do we truly attend to what they are telling us about their lives?" Another question this story might engender is: "Do we know how to and do we take time to work with patients in holistic ways, using strategies that contribute not only to their cardiovascular health, but also to a healthy mind-body connection, or do we focus only on the immediate CVD-related issues?"

Moving from personal knowledge to the interpretive and aesthetic, the second article, "Women's Experiences of Heart Surgery Recovery: A Poetical Dissemination", is an interpretation of women's experiences of recovering from heart surgery written by a nurse scholar. This manuscript is unique in two ways: it is written by one of the 'trainees' in the FUTURES program (Tapp, 2005), a program designed to prepare cardiovascular nurse scientists; and the author, Jennifer Lapum, uses a cutting-edge approach to disseminate a review of the literature – she scribed a poem. Using poetry as a literary

medium allows this writer to shift from an objective to an emotional stance. Poem-writing, as an aesthetic way of knowing, is a strategy consistent with perspectives on women's health that value emotion. Attending to the emotionality of the experience of recovering from heart surgery through poem-writing is a strategy that may engender empathic responses in readers toward reifying the notion of a mind/body connection. Such a strategy, when it works, models a holistic view of health. When you read Lapum's article, I invite you to reflect on how this poem works for you as the reader. Does Lapum's poem elicit emotion and/or empathy for you? Bold and creative strategies such as that undertaken by Lapum in this article open up new ways of thinking about, and practising nursing. From my perspective, we as a community of cardiovascular nurses not only benefit by reading and reflecting on the products of such innovative scholarly endeavours, but our field depends on daring, agile minds such as Lapum's to advance cardiovascular nursing.

Anxiety is a palpable theme in the first two articles of this issue, a theme that is a focus of the research presented in the third article, "Gender of the Care Environment: Influence on Recovery in Women with Heart Disease" prepared by Woodend and Devins. These researchers report on an empirical study designed to address how the predominantly male treatment environment for heart disease accounts for some of the sex differences in distress evident in cardiovascular patients. This study makes no bones about, or apologies for taking a gender perspective on the issue of cardiovascular care, a stance that is refreshingly pragmatic. The researchers name the issue in terms of the well-documented history of male domination in the field and generate a hypothesis that is then tested with the result that new knowledge about the context of cardiovascular care is produced. The authors of this article urge nurses to attend to the gendered nature of cardiovascular care units. If included on your journal club list, discussions about this research may elicit discussion about and reflection on the values and beliefs about women's health and cardiovascular care that shape practice in your workplace.

In the fourth article, the issue moves from personal, interpretive/aesthetic and empirical knowledge to practical knowledge. Price and her writing team present a marvelous case study in which reflection on the gendered nature of the

care environment led to the development of an innovative and highly successful cardiac rehabilitation program. In this article, the authors provide a blueprint for a CVD care environment that meets the needs of women. The description of the development of this program educates readers about the principles of women's health while providing a case example in which the principles are applied to serve women's interests in a cardiovascular care setting. Thus, this article speaks directly to the theme of the issue, women's health and cardiovascular care. The care the authors take to link their planning process to the core principles of women's health underscores the exemplary level of thoughtfulness and scholarship the program planners brought to the task. Perhaps this article will provide readers with a language relevant to, and a blueprint for, advocating for change in cardiac rehabilitation settings. Further, publishing this work may catalyze the development of networks and mentoring relationships, processes central to instigating wide-spread change to benefit women.

In addition to developing networks and mentoring relationships, what is necessary for instigating change is new empirical knowledge about the physiology of women and cardiovascular disease. Swansburg and her writing team do just that in the fifth article of this issue. The findings of an empirical study that are reported here contribute to knowledge about the pathophysiology of preeclampsia and its effect on the fetus while pointing to directions for future research. As editor tasked with finding reviewers for this study with a paucity of possibilities, it became clear to me that there is an urgent need in Canada to prepare physiological nurse scientists. Thus, we are delighted to support these nurse physiologists by publishing their work with full recognition that such work is of considerable importance to knowledge development in nursing and must be supported in the cardiovascular nursing community in Canada.

Completing the manuscripts accepted for this issue is a paper by Sawatzky in which the author uses theoretical knowledge to address cardiovascular health in women. Guided by a population health framework, the author invites us to see beyond the individual perspective that dominates thinking in cardiovascular arenas to a perspective that encompasses system-level factors that impact women's CVD health. Sawatzky outlines diverse social and economic

factors that underlie the development of CVD, presenting research to support her argument. Sawatzky calls nurses to policy-level action, arguing that such action must be a significant focus for nurses in addressing women's health and CVD care.

Augmenting the peer-reviewed manuscripts, the clinical and research columns featured in this issue provide information to inspire dialogue. Enns, in the clinical column, takes a provocative approach to reporting her experience of attending the Canadian Hypertension Education Program meeting held in Ottawa earlier this year. Here, Enns speaks to the challenges of developing multidisciplinary, women-oriented approaches to hypertension management given the history of gender-blindness and medical dominance in the CVD field. Then, in the research column, I provide a brief overview of Participatory Action Research (PAR) and ask, then address, whether or

not PAR is a research tool that has potential to advance women's health in cardiovascular care settings.

Women's health and cardiovascular care is the focus of a stunningly thoughtful document, "The 2000 Victoria Declaration on Women, Heart Disease and Stroke". In this declaration, the authors urge stakeholders, broadly defined, "to marshal their efforts and invest resources in the prevention and management of heart diseases and stroke among women". In this issue of the **Canadian Journal of Cardiovascular Nursing**, we join other efforts to address the long-standing and deeply entrenched oversight of women's health in the cardiovascular field. In engaging with this issue, we hope that for you, the reader, the idea of women's health and cardiovascular care will deepen in meaning or take on new meanings, and maybe even inspire action! ♥

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Cardiovascular Care and Health: One Woman's Story

Anonymous

I have been asked to write this article from the patient's point of view. I am not a health care professional and so I will be presenting events as they appeared through my eyes, and the feelings that came with them. I have always been an active woman who has never smoked, has normal blood pressure, has never been overweight and has eaten well. I have played racquet sports all my life and our family enjoys the outdoor life wherever we live.

Finding Out I Am at Risk

In autumn of 1986 I had a physical examination and requested a cholesterol test, following which I received a phone call from my general practitioner. Within a five-minute conversation he called me "dear" twice, so I knew he had some bad news for me. It appeared that I was in the top five per cent of the population at risk for a heart attack because of an elevated cholesterol level. I was 38. I knew our family had a history of heart disease as my father had a massive heart attack when he was 42 and, for years, I had taken simple precautions with my diet. As I was involved in various sporting pursuits, I had assumed that these, too, would protect me. Over the next few months, I tried to alter these results by improving my diet. It did not help. The following summer, my two sons, aged seven and nine, had their levels tested with the elder one's results showing that he, too, had an elevated cholesterol level.

Early in 1987, I had an appointment with a specialist at the local university teaching hospital. He led me through a noughts and crosses chart of my family tree. Cancer was one recurring symbol on the family tree, heart disease the other. It showed that coronary artery disease appeared on both branches of the family tree for me. My father and his brother had suffered heart attacks, and my maternal grandmother and aunt had died of undiagnosed heart problems while in their forties.

Again, I made great efforts to control my high cholesterol level with diet. Then, on the advice of the heart specialist, I tried Questran, which gave me stomach problems and did not alter my results sufficiently. They thought Statins would help, and so I started my long relationship with the Statin family. February of 1989 brought the news that my younger brother had undergone double bypass surgery at age 32. I was stunned. I became super-vigilant with my family's eating habits and I made sure that we had great family times together. In this I was influenced by my mother's relatively early death from breast cancer.

Learning to Live with Heart Disease

Later in 1989, we moved. I found a new group practice and was asked to take my first-ever stress test. I did so and ran for a lot longer than I wanted, but with no ill effects. I was welcomed into the practice, told I was dealing well with tackling my cholesterol problem, but that I had mitral valve prolapse (MVP) and, thus, must take antibiotics before dental work. I was given a large prescription at my first visit to the dentist and, within five minutes of taking my pills, my lips and tongue began to swell. It was all very frightening. I phoned the practice to ask if this could be an allergic reaction and they said, "yes - drive straight to the nearest hospital." As I did not know where that was, I chose to drive to their office. This experience was one of many which changed the way I looked at the medical profession. I started to ask more questions, to look for second opinions if I was unsure of a drug, the diagnosis, or the doctor. I became proactive and informed about my health and that of my children, one of whom had a life-threatening disease. I learned to ask if EEGs and CAT scans were necessary and how to get them quickly. I learned to keep looking for answers when dentists and doctors could not solve a health problem.

In 1995, we moved into our present home and, over the next few months, I found a general practitioner, a cardiologist and an allergist. I continued on my exercise, diet and medication routine and was told by my new cardiologist that I did not have MVP. This annoyed me as, for several years, I had been living with the threat of dire consequences if my heart developed an infection, but it also reinforced my proactive attitude and showed me once more how doctors' opinions can differ. I played sports, worked part-time, volunteered and, in general, lived life as I had in every other place we had lived.

This continued until the fall of 1999 when, on the tennis court, I had chest problems. I used my Ventolin inhaler as I thought I was having a reaction to the heavy hairspray being worn by my partner! I visited my GP who sent me for various tests. I saw my cardiologist the next spring and was told that I had angina caused by coronary artery disease. No treatment was indicated and I realized that even though I had lowered my cholesterol level, my arteries were slowly thickening. I was given a nitroglycerin spray. I relaxed and looked forward to summer. Perhaps this is difficult for health care providers to understand, but I had known that I

had CAD for years, and now I had been reassured after a reasonable review that I could go on for a long time in my present condition.

Four months later, I started having severe chest pains when lifting, going up stairs, walking up slopes and during many other activities. I consulted the internet and realized that I had moved from having angina into “unstable” angina. This was just my opinion so I booked an appointment with my GP who, unfortunately, was on holiday. When I went to the doctor’s office, I was seen by a very young ‘locum’. He immediately began looking for an aspirin to give me, and told me to drive straight to the local hospital. There, I was told to consult my specialist and that I needed tests, and was discharged. I wondered if this was the way things should be progressing but, in all my experience of life with cardiac disease, no one ever says how sick you are. For this reason, it is hard for the patient to assess what to do, especially when they are in a stressed state. Is it fear of the patient over-reacting? Shouldn’t the patient be considered part of the team in addressing their health issues – therefore, be fully informed?

I saw my cardiologist the next week and was placed on a waiting list for an angiogram. I hoped that an angioplasty would be my answer. Meanwhile, I started to wear nitroglycerin patches that gave me headaches. I returned to the local hospital two more times in the next two weeks with chest pains. It was difficult to convince the front-line staff, usually the nurse at the desk, of my problem. I am petite and I looked healthy and young for 50. I stated that I was waiting on an angiogram and that it was possible that I had several artery blockages.

Each time I left the emergency ward, it became harder to keep a brave front on things. I had company staying that summer, and my husband had returned to work after two weeks off. I did not tell anyone else of my predicament. I just said that I’d been told to take it easy for a while. Even now, I find it difficult to write of my feelings. Remember, no one had actually said I was seriously ill, just that an angiogram was needed. It is difficult to sit and wonder if you are a hypochondriac, and if all the fuss is for nothing. On the other hand, it was awful to wonder if I would be seen in time, as I knew the length of the waiting lists. I pushed these matters to the back of my mind as much as possible. The system annoyed me, not the people. I have tried, over the years, to focus on the positive; being bright and cheerful and not letting the situation get me down. Earlier, I wrote of how proactive I had become. Well, in these weeks of waiting, my attitude was different. It seems, in retrospect, that I focused internally and hibernated. I took great care of myself in those weeks and I think my objective was to stay as well as possible and get the tests I needed. I did not get upset or excited or mad at things as I saw that as a way of worsening

my condition. It was unfortunate that my GP and my cardiologist were away during a lot of this period as they were the people with whom I felt at ease.

Cardiac Surgery

Pain would come at any time, and most frightening were the dreams that surrounded it at night. I stopped driving and only went up and down stairs once each day. At the beginning of the fourth week, I woke up late at night with massive chest pain. My husband was away, so my son took me back to the local hospital where the emergency room doctor admitted me and put me on various drips. I was relieved to be there as for the past three weeks I had believed that I was living with a time bomb in my chest. The next morning, the internist phoned the big teaching hospital and the following morning I was taken by ambulance for an angiogram. As I was a last-minute addition, I followed all the men who had regular appointments.

I was under sedation because of considerable pain during the procedure, so I was awakened to see the monitor, which showed three blockages that were pointed out to me. I was told that I needed bypass surgery. I asked when I would be called back for the surgery and was told that it was an emergency and that I needed it as soon as they could find a surgeon. I asked for my husband and went back to sleep. I knew that I had done all I could for more than 12 years and that now I had to leave it up to someone else. I went into surgery at five that afternoon.

I remained in hospital for six days after the surgery. The eerie glow and constant hum of the cardiac care ICU felt completely normal to me, as if I’d had an out-of-body experience, which I’d had in a way. I felt like an alien, with all the tubes, monitors and paraphernalia attached to me. Gradually, I slept less, observed more and was assisted out of my bed. The shifts came and went and everyone was helpful and supportive. The next day, I was moved to the recovery ward where I started on the first walk of the many that would follow. Arms were held across my chest as I shuffled up and down the halls. I walked as much as possible on the recovery floor, reassured by all the beeps and blips from the machines I took with me. I consulted the monitors along the hallway just to see my name and the line showing that I was alive. I watched a doctor eat a Big Mac and fries on the ward and wondered. I attended physiotherapy with several men and gazed at the number of staples on the body of a six-bypass fellow. In general, pain was controlled while I was in hospital and it was reassuring to know that someone was watching over me all the time.

The first night at home was excruciating, nerve-racking and exhausting. I was learning pain management by myself and found it difficult to lie back and go to sleep. My husband piled pillows up for me,

but I could not relax enough to shut my eyes. Would I wake up in the morning? There were no blips and beeps to help me. I have undergone several surgeries and had two difficult deliveries, but I have never felt pain like that pain. I invented a procedure for getting out of bed. It took five minutes. I couldn't wash my hair in the shower, as I couldn't raise my arms. I became constipated from the pain pills, and, on the advice of a nursing friend, took an herbal laxative.

The second day at home I was at my doctor's office seeing yet another doctor as my own doctor was not available. I had been given a sheet of directions on leaving the hospital, and there it was – watch out for a fever. Well, I was in the doctor's office since I had one, but the doctor said to “wait and see”. Three days later, I was back at my own GP asking about pain medication. The surgeon had given me a prescription for pills on leaving the hospital and I had followed the directions faithfully. The pills were finished in two days. I really needed a help line where I could ask questions, as there were no refills and I thought it meant that I should not need medication. The sheet of directions did not cover this. During the second 12 hours without pain relief, I started taking my son's pills left over from an emergency appendix operation. My own GP was taken aback at the low number of pills prescribed by the surgeon. So, he wrote a prescription for 60 pain pills. In the end, I used less than a third of the 60, and gradually moved on to over-the-counter pain relief.

The Road to Recovery

During the second week, I requested a treat, so my husband and I went out for lunch. We ordered and the meal took a while to arrive. That's when I knew I had taken on too much. It takes an awful lot of strength for the skeleton to hold up the body. I could feel my body shrinking back down into a shell, and I knew I would be curled up on the chair if the food did not arrive soon.

In all of my recovery time, I felt that I was climbing a mountain by myself. As the surgery had come so quickly, I had not had any preparation or information about coronary artery bypass. It seems to affect different people different ways. I have an uncle whose leg caused problems after a similar surgery, but his chest did not. My chest felt as if an elephant had split it, and even breathing could cause pain. My muscles seemed to have shrunk and I felt that it was a huge effort to hold myself up.

As I am fit and active and had modified my diet over the years, I was told I did not need to join a cardiac rehabilitation class. By week three of recovery, I was at the cardiologist's office. The doctor listened to my chest, asked about my temperature and took me straight back to the big teaching hospital for another

surprise. A large syringe was stuck in my back and fluid withdrawn from my left lung. It lasted a short time, but it felt like forever. Very frightening!

In the course of the next few weeks I had regular check-ups, x-rays and a stress test. I walked more and more in the house and yard and, eventually, started going short distances in a local park. I was allowed to drive again, and that helped. I was told I could not return to work for 12 weeks, later altered to 16 weeks. Once again I returned to my routine, but now walking daily was part of it. Over the months, I increased my walking distance until I walked for nearly an hour each day. For bad weather we invested in an exercise bike, the kind that is good for your back. I have found other activities in recent years, as I no longer play racquet sports. I am back to my regular life and my cholesterol level is within the normal range.

I am grateful that the surgery worked and that I have been given more time. I have regular stress tests, and I have had an MIBI and another angiogram when problems arose. I continue to eat well and exercise but, as the surgeon told me, I will be dependent on drugs to fight CAD. And yes, I am still taking a Statin.

What have I Learned?

1. Ask questions – especially about drugs.
2. Ignore the dirty looks you sometimes get. I have a latex allergy and, on numerous occasions, I have been approached by someone in the wrong gloves, in spite of the sign above my head. Ask questions.
3. Work the system to your advantage. Find someone reliable with whom to discuss issues. In my case, I consult my GP. He understands my life and knows about the demands made upon me. We discuss conflicting medical advice as doctors don't necessarily agree. We balance out the reason for taking a drug with its nasty side effects (e.g., Fenofibrate causing day-long nausea, Crestor causing dashes to the bathroom many times per day). He knows how difficult it can be to work in these circumstances.
4. Be proactive and informed. We were sitting in London when my son heard the warning about Baycol. I had been taking it for 18 months.
5. Learn about your body and trust your judgment. I had used the system and stayed as healthy as possible for many years. I ignored the patronizing attitudes and disbelief I found in many areas.
6. Mental attitude plays a big role in recovery and continued well-being. There are lots of ways to relieve stress. Find out which ones suit you.
7. Be understanding of those with whom you are dealing. Most of the medical profession treated me with great dignity and care. I wrote thank-you letters to many people who had helped me get the

treatment I needed. I find that being friendly with and appreciative of those looking after me makes us all more comfortable.

8. Find out about other remedies. I always consult a physician, but wonder if my father's way would have been better for me. He is now 84 and very fit for someone with severe CAD. He refused all meds until three years ago, and hardly ever sees a doctor. Now he takes a beta-blocker. He won't take Aspirin or nitroglycerin. He walks for pleasure daily, eats what he wants (especially bacon and eggs) and he enjoys his days.
9. Find humour even when things are tough. I turned to developing cartoon moments. Below my comments were thoughts not spoken:

Doctor: May my students feel your ankles?
Me: Why didn't I shave my legs?

Nurse: You can't have chest pain.
Me: Well, if I weren't in so much pain I'd laugh.

Doctor: You are a type A personality.
Me: Tell me something I didn't know. All these years I have been working part-time and going to yoga in order to relax and live a full life. Anyway, you are too.

Dietitian: What foods can't you eat?
Me (aloud): A long list including red and yellow food colouring. So, lunch brings... red jello!

I hope you are smiling, it lowers the cholesterol. ♥

The Canadian Health Network: Assisting Canadians with Their Online Health Information Needs

Canadians are increasingly turning to the internet to search for health information. While health professionals applaud this proactive approach to self-care management, they realize the average Canadian faces a number of challenges when using the internet as an educational tool. First, when a health term is "googled", Canadian consumers must wade through an overwhelming number of "hits" to find the information they are seeking – a time-consuming, often frustrating process. Second, most consumers do not possess the expertise to assess the reliability and validity of on-line health information potentially leading to unsafe choices and practices. Third, Canadians face an added difficulty as a great deal of web-based health information has an American focus and may not reflect Canadian statistics, Health Practice Guidelines and even units of measurement.

To respond to the growing need of helping Canadians find the highest quality and most relevant health promotion and disease prevention information, The Canadian Health Network (CHN), www.canadian-health-network.ca, was established in 1999. This bilingual website was initiated by Health Canada and is now funded by the Public Health Agency of Canada. Expertise in more than 20 different groups and topics including diabetes, healthy eating and women's is provided by affiliates who represent reputable, non-profit national and regional organizations.

Capital Health in Edmonton, Alberta, is proud to be the Cardiovascular Disease and Stroke Affiliate. Affiliates do not re-invent existing on-line health content, rather they use their expertise and rigorous quality assurance standards to select high-quality, relevant on-line resources from trustworthy

contributors that reflect Canadian health information needs. Some of the cardiovascular disease and stroke content contributors include The Heart and Stroke Foundation, The Lipid Nurse Network and The Canadian Association for Cardiac Rehabilitation.

Once selected, the resources are housed on the CHN site providing a "one-stop-shopping" experience. The site is easy to navigate with many different search options including an A-Z index and keyword and guided search functions. The Canadian Health Network is also pleased to offer a free subscription to Healthlink, an e-mail newsletter that offers a scan of new articles, key dates and intriguing facts about health twice each month. Just look for the "subscribe" button on the homepage. Health professionals can also access a variety of free CHN promotional materials for distribution among their patients. Simply contact CHN at the e-mail address below.

In addition to managing the content of their topic-specific resource collection, affiliates are responsible for developing frequently asked questions (FAQs), and responding to health information requests from consumers and writing feature articles.

The Canadian Health Network continually strives to provide information that reflects current Canadian health information needs. The Cardiovascular Disease and Stroke Affiliate wants the clinical expertise and insight of cardiovascular nurses in developing frequently asked questions and future feature articles.

Please contact Susan Jacka, RN, MN, Content Specialist, Cardiovascular Disease and Stroke Affiliate at susanjacka@cha.ab.ca for more information or to submit suggestions. We look forward to hearing from you. ♥



Women's Hypertension Management in Canada: Golden Opportunity for Nursing or Continuation of the Medical Practice Model?

Brendalynn Ens, RN, MN, CCN(C)

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Most health professionals are aware that hypertension is a major health risk. Hypertension continues to be the third largest risk of death in the world affecting one in five adults (Joffres, Hammet, MacLean, L'Italien, & Fodor, 2001) and contributes to the development of at least one-half of all cardiovascular disease. Overall, the prevalence of hypertension steadily increases with age in both men and women and is often accompanied by other equally significant risks including hypercholesterolemia, glucose intolerance and abdominal obesity (Joffres et al., 1992; Burt et al., 1995). Despite best efforts, fewer than 30% of those with hypertension are actually well-controlled with initiated therapies (Chocklingam, Campbell, Ruddy, Taylor, & Steward, 2000).

But what is hypertension's specific impact on women's health? We now know that hypertension affects more women than men in their seventieth year of life and the incidence climbs more steeply for women beginning as early as age 30 (Campbell et al., 2003). Recent research sheds light on the issue of women and hypertension. Burt et al. (1995), in a study using data from the US National Health and Nutrition Examination Survey III (NHANES III), report the age-adjusted prevalence of hypertension in non-Hispanic black women to be 31 %, compared to 21% in white women and 25% in white men, and that white women were slightly more aware of the issue of hypertension than black women. In another analysis of NHANES III designed to explore the link between women's social status and CVD risk, Young, Cunningham & Buist (2005) found that lone mothers are more likely than partnered mothers to be hypertensive. Thus, recent research suggests that some women may be

at greater risk for hypertension than others, and that there may be some groups of women who would benefit from focused health education. Generally, it is accepted that hypertension is an important risk factor for CVD in women and that treatment is beneficial (Chobanian et al., 2003). Bittner and Oparil (2002) note that except for the forms of hypertension that are unique to women, that is hypertension related to pregnancy and oral contraception, the diagnosis and treatment of this health issue is the same for men and women.

To address these known population health issues, a comprehensive education program, CHEP (Canadian Hypertension Education Program), was developed in 2000 as Canada's national strategic plan to improve hypertension control. Central to this strategy was the use of current recommendations for treatment and comprehensive education materials. These recommendations were based on evidence trials reviewed annually by members of BP Canada (formerly the Canadian Coalition of High Blood Pressure Prevention and Control), and the Canadian Hypertension Society. Authors of recent publications attribute the CHEP program to recent increased trends in pharmacologic prescriptions of the top four therapies for hypertension management, but readily admit that a true assessment of CHEP's impact would be to see updated surveillance data on cardiovascular risk reduction among Canadians (Campbell et al., 2003). Population-level hypertension data were at best difficult to acquire, however, negotiations are in place to determine how this might be accomplished in a health risk survey that will be conducted by Statistics Canada in 2007 (Campbell, 2005).

An opportunity recently presented itself for me to attend a national CHEP meeting to review preliminary results on CHEP's effectiveness as a representative of the Canadian Council of Cardiovascular Nurses (CCCN), a most valuable and rewarding experience. There, results from a multidisciplinary review regarding awareness of CHEP in clinical settings were presented; they illustrated that overall awareness of the hypertension recommendations and education program was the largest stumbling block in the process. Data specific to nursing revealed that not all nurses were aware of the guidelines or familiar with how to access relevant information. CHEP's meeting agenda included building strategic multidisciplinary linkages. CHEP asked: "What can CHEP do to better engage nursing groups?"

During this entire process, it occurred to me that perhaps the reason CHEP information has not been wholeheartedly embraced by multidisciplinary groups is the medical, top-down model upon which the CHEP program was built. With closer scrutiny, the medical model favours a downward dissemination of information from experts that clashes with many nursing health promotion and primary care nursing models/strategies. Nursing representatives at this meeting led a discussion to explain and relate nursing's vision for health promotion that included patient/client education, participation in decision-making, prevention strategy variations in practice and health promotion cornerstones including capacity-building and self-management practices. Women's health issues are primary concerns in health promotion and prevention. CHEP's understanding of nursing's impact and potential remains preliminary, but I believe the beginning seeds have been sown as a way to begin to include nursing in a successful partnership with CHEP.

The CHEP group also asked: "What can nursing now do for CHEP to facilitate greater success?" Our answer was: collaboration that embraces nursing's visions for participative decision-making, with heightened awareness of women's issues and hypertension. In my opinion, a four-fold plan should be considered:

1. Continue building strong multidisciplinary collaborations at the national level to address hypertension issues. These should include active and invited participation from specialties of nursing (together with advanced practice nurses) in the planning, implementation and evaluation processes.
2. Promote self-management and self-determinism for our patients/clients through relational initiatives and consistent education messages utilizing validated health promotion models.
3. Promote patient education through various multidisciplinary forums and mediums, not just traditional mechanisms and, finally,
4. Recognize the unique needs and challenges, associated with hypertension that women face including growing trends, heightened risks, longer lifespan and more challenging management barriers to control this chronic and insidious disease.

In conclusion, the health of Canadians could be greatly enhanced through CHEP by embarking on a truly multidisciplinary initiative. The 'hypertension challenges' in Canada (surveillance, awareness, diagnosis, management and control) offer nurses a golden opportunity to educate medical colleagues about nursing strengths and our unique practice, and help them better understand what nursing truly can offer and what can be achieved by collaborative multidisciplinary practice. Let's not miss this opportunity! ♥

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Women's Experiences of Heart Surgery Recovery: A Poetical Dissemination

Jennifer Lapum, RN, BScN, MN, PhD

In this article, I provide a review of the empirical literature on women's experiences of recovery from heart surgery. I suggest that recovery is gendered in that women's experiences interface with the spaces and places that women inhabit. As a result, it is important for nurses to consider care from an interpretive framework. Recognizing the need to tailor research dissemination to the subject matter at hand (peoples' experiences) and the research methodology most appropriate to inquire into peoples' experiences (qualitative), I employ an

unconventional method of research dissemination in the literary form of poetry. The type of evidence that emerges within qualitative research demands we take a critical look at how we disseminate knowledge. Poetical dissemination of research may engage nurses on a different level of thinking and invite nurses to reconceptualize their practice based on the evidence.

Key words: women, heart surgery, recovery, poetry, dissemination

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Are you aware of that thing that beats beneath your skin? Just inside your chest cavity, beyond the bony protective cage, beyond the normal optical range of the eye. Gaze down, gaze inward, let your mind dilate. Imagine – visualize – your chest being cracked open in order to fix your failing heart. Your heart being touched by the human hand. Technological intervention recasting your story. Open – Closed – Time to recover. The experiential side effects of open-heart surgery staring you down in the everydayness of your life. A history you cannot erase. A projected future you must amend. A present saturated by what happened. A story recast. What is the recovery experience like for women following open-heart surgery?

The purpose of this article is to provide a summary of the empirical literature on women's experiences of heart surgery recovery. Dissemination of the knowledge in this area is facilitated through the use of poetry. The significance of this article is twofold: (1) to provide a personal and rich understanding of women's recovery experiences from heart surgery; and (2) to open up our way of thinking about research dissemination and ways of knowing. In this article, I address: the genesis of my thinking and crafting, the importance of an inquiry into women's experiences, a consideration of qualitative findings, poetry as a method of dissemination, a summary of women's experiences of recovery from heart surgery, and future issues. My aim in this article is not prescriptive; rather, I hope this poetical representation of women's experiences of heart surgery recovery is thought-provoking and, perhaps, may influence you to reconceptualize your practice.

The Genesis of My Thinking and Crafting

As I embarked on a review of the literature on peoples' experiences of heart surgery recovery, I quickly recognized the presence of research that focused on women's experiences over the past decade. For this reason, I felt it would be beneficial to conduct a systematic review of women's experiences of heart surgery recovery. Such a review could provide a summary of the evidence and provide a frame of reference for what the recovery experience is like for women who have undergone heart surgery. The principles of quality in qualitative research as developed for the National Centre of Social Research (Spencer, Ritchie, Lewis, & Dillon, 2003) framed my critique of the studies. These principles address 1) contribution to a wider knowledge and understanding, 2) defensible in research design, 3) systematic and transparent research process, and 4) credibility in claims through offering well-founded, rich and plausible evidence.

The poetry forthcoming is a representation of women's experiences of heart surgery recovery based on a systematic review of the research. I began crafting the poem, "At The 'Heart' of Women's Recovery," as a result of the beginnings of my review, which included studies by Angus (2001), Hawthorne (1993) and King and Jensen (1994). Initially, the emerging data and analytical interpretations from these particular studies constructed the framework of the poem. As I continued with the completion of the systematic review, I felt driven to enfold the other research into the poetry. The poem is crafted around two main ideas that emerged from the research: (1) women are changed and marked in that their lives are altered and their sense of self is

disrupted (Hawthorne, 1993; King & Jensen; Plach, & Stevens, 2001; Robinson, 2002), and (2) being sent home to recover from heart surgery is a unique experience for women because of the mediating effects of women's social positions in the home, women's interpersonal relationships and women's expected roles and behaviours (Angus, 2001; Hawthorne, 1993; King & Jensen, 1994). My initial crafting of the poem was not purposeful, in the sense that I did not write it as a method of dissemination, but the poem emerged in a way that helped me to make sense of women's experiences. Nevertheless, as my systematic review progressed, I began to develop the poem purposefully to promote a richer understanding of women's experiences. Other than the critique itself, a helpful component of how I structured this systematic review was to outline the findings from the studies to identify researchers' analytical and thematic understandings, and to identify various participant quotes that form the essence of women's recovery. It was these components that led to the composition of the poem.

The composition of this poem is a polyphony of voices including the participants, the researchers and my own voice. Initially, I attempted to assign primacy to the participants' voices from these studies in order to immerse readers in their experiences, but my commitment to the interpretive nature of research (Denzin & Lincoln, 2000) demanded that I simultaneously acknowledge my own voice and the researchers' voice. Thus, the researchers' analytic voice as heard within reports of their respective studies are threaded throughout the poem, and my own interpretive and analytic voice as a poet, a nurse and a scientist also becomes part of the evolving story. I made a decision not to delineate the various voices within the poem because I believe the fusion of these voices is the essence of what guides our thinking and our practice. Further, I hope, through the process of resonance, that your voice also becomes intertwined within the stories of women's recovery from heart surgery. Initially, you may think this is inappropriate or unhelpful, and something with which you may not be familiar. However, the dialogical aspects of selfhood (Frank, 2002) suggest a Self always in relation to an Other and human nature that "is socially constructed in and through dialogues" (Sampson, 1993, p.21). For this reason, my purpose is not to provide you with a traditional form of evidence in which the "truth" about women's experiences are presented in a monological way. Rather, I invite you to engage in the experience of women's stories of heart surgery recovery on levels of morality, emotion, aesthetics and intellect (Richardson, 1994). Although our own voices may be considered a bias in the dominant mode of research, they merely reflect our own understandings and experiences of the complexities of gendered social life and nursing practice.

The empirical literature concerning women's experiences of heart surgery was reviewed by searching CINAHL and Medline, dating back to 1980. I searched for studies that focused on women and studies in which the recovery experience was a part of the research substantive focus. This search revealed nine qualitative studies (Allen & Wellard, 2001; Angus, 2001; Dingley, Bush, & Roux, 2001; Hawthorne, 1993; King & Jensen, 1994; Murray, O'Farrell, & Huston, 2000; Plach & Stevens, 2001; Robinson, 2002; Rosenfeld & Gilkeson, 2000). Although I crafted this poem, the ideas and many of the words were drawn from an array of people, including the participants and researchers in these studies. In a sense, they become co-authors of this poetic dissemination of women's recovery experiences from heart surgery.

Women's Experiences

It is noteworthy that heart surgery research prior to the 1990s tended to be quantitative in nature and focused primarily on men's experiences. This research has been invaluable to the progression of the cardiovascular sciences, but the result was that cardiac care was designed based on the male experience (O'Donnell, Condell, & Begley, 2004). Furthermore, cardiac care was based on outcomes of mortality, morbidity and economics. Patients' experiences tended to be disregarded in the earlier research. Today, women are much more likely to be included in study samples, and research is also directly addressing peoples' experiences. This is important because the nature of men's and women's social lives and identities are different (Goffman, 1977), suggesting that women's experiences of heart surgery recovery may not be comparable to men's experiences.

Gender is relevant to one's performance, activities and social life (West & Zimmerman, 2002) and is an important attribute to address when considering an individual's daily affairs (Fenstermaker, West, & Zimmerman, 2002). Angus (1996) suggests that "women and men encounter different social and material conditions that constrain or facilitate recovery" (p. 15). An idea that is also supported by West and Zimmerman's convictions that "gender is a powerful ideological device that produces, reproduces, and legitimates the choices and constraints" (West & Zimmerman, 2002, p.23) in one's life. In a review of the cardiovascular literature, McCormick (1999) suggests that women's experiences of coronary bypass are different than men's experiences, but an in-depth exploratory account is absent from this report. Penckofer and Holm (1990) suggest that "making comparisons between genders [is] speculative at best" (p. 17), but they do predict that women's multiple roles influence their recovery from heart surgery. Therefore, an inquiry into women's experiences of heart surgery recovery can discern new evidence (Harding, 1995). We

need to shed light on the unique spaces and places that women inhabit, and further understand women's experiences of heart surgery recovery.

A Consideration of Qualitative Findings

An understanding of peoples' experiences can help us to understand their needs and to determine "how these needs can best be met" (Cohen, 1995, p. 159). Developing an understanding of women's experiences of heart surgery recovery lends itself well to a qualitative approach. Qualitative methods can best address questions of attitudes, beliefs and experiences (Pope & Mays, 1995), and can most optimally access the experiences of people. Thus, in this systematic review and poetical dissemination, I purposefully considered only qualitative studies that explored women's experiences of recovery from heart surgery.

Qualitative findings and the meaning of qualitative findings are different from quantitative and, thus, may require a different approach to dissemination. The notions of statistical inference, causality and generalization that are dominant in quantitative research, are not the focus of qualitative methods. Qualitative findings tend to be represented through the establishment of themes, utilization of a narrative style and a richness of participant quotes. Estabrooks (2001) suggests that dissemination of qualitative findings may be more accessible to clinicians because its narrative form is more understandable. In this particular case of disseminating the evidence, the purpose of dissemination is focused on a way of thinking and, in turn, a way of practice. Sandelowski (1998) emphasizes that a key element of successful dissemination of qualitative research is selecting an appropriate representation style. Thus, what sort of representation style is most appropriate for qualitative findings? What method of representation is timely and thought-provoking? A broader and more inclusive understanding of the process of dissemination (Barnes, Clouder, Pritchard, Hughes, & Purkis, 2003) and an approach that is thoughtful and systematic can engage readers in ways that the knowledge may be more apt to infuse into their thinking and practice. Dissemination of knowledge within a journal article does not necessarily have to be provided in a third person writing style in which the facts are provided in a static manner. Alternatively, first-person writing styles and methods that engage the reader to become part of the text may be beneficial. For this reason, I chose an unconventional method of dissemination – poetry.

Poetry: A Method of Dissemination

Poetry as a method to disseminate knowledge derived from a systematic literature review was absent from my review of the literature. However, there are numerous examples of researchers and scientists using poetry at various stages of the research process. Poetry has been used as a mode of representation of research findings

(e.g. Baff, 1997; Carr, 2003; Glesne, 1997; Poindexter, 2002; Richardson, 1992) and others have used poetry as data (Cody, 1994; Furman, 2004; Oiler, 1983). Furthermore, a colleague and I used poetry in the conceptualization stages of our research (Leung & Lapum, 2005a; Leung & Lapum, 2005b) and as a method of reflexivity (Lapum & Leung, 2005). Despite the prevalent use of poetry within research, the benefits of poetry have been under-researched in nursing (Hunter, 2002). This may be a result of the higher value placed on the science of nursing (Carper, 1978).

Empirical methods that involve using observation and measurement to identify truths that can be used to predict outcomes are the dominant discourse in knowledge development in biomedicine (Donaldson, 1995). Definitions of science are socially constructed and reflective of the times; broadly speaking, science can be defined as the processes that are aimed at understanding, explaining and predicting. Scientific knowing was ushered in by the modernistic beliefs that rationality, empiricism and reason should guide thinking and actions, and emotion, tradition, religion and superstition should be rejected from the guiding epistemologies (Lister, 1997; Traynor, 1996). A focus on the science of nursing has advanced nursing practice and ensured that practice is based on a systematic, empirical and objective approach. Such an approach has resulted in objective evidence to guide decision-making, and has also served to keep uncertainty at bay, when we are all well aware that uncertainty can be fatal in cardiovascular nursing. Nevertheless, sometimes certain forms of evidence and knowing cannot be obtained using the strategies for scientific knowing that are most highly valued. Estabrooks (2001) cautions that a "focus on scientific knowledge to the exclusion of other knowledge forms" (p. 283) is not appropriate, nor beneficial.

Other types of knowing such as aesthetics, personal knowledge and ethics (Carper, 1978) are relevant, particularly when human experience is of interest. Furthermore, there are many dimensions to the ways of knowing and knowledge that informs our practice and, thus, a broad and inclusive epistemology needs to be considered, one that addresses the idiosyncratic nature of human experience. Although scientific knowing remains at the top of the socially constructed hierarchy of knowing in health care, other ways of knowing are (re)-emerging (e.g., the arts and poetics). The arts and the sciences co-existed at one point in history (Cody, 2002), yet a sharp demarcation between the arts and the sciences has been constructed (Cody, 2002; Paley, 2004) within the dominant discourse of biomedicine.

The relationship between the arts and the sciences has been ambiguous and ostensibly antithetical. The notion that the arts and the sciences are polarized and at odds with one another is not necessarily true. Although the

underlying assumptions that guide the methods of the arts and the sciences are different, Sandelowski (1995) suggests that both the arts and the sciences are “oriented to understanding” (p. 206). I believe dichotomizing the arts and the sciences is not beneficial and that a synergistic relationship between the two can enhance our understanding and the knowing that informs our practice as nurses. Particularly, poetry may be one method with which we can embrace the unique nature of experiences to bring forth a more nuanced way of thinking about peoples’ experiences of heart surgery recovery.

I do not want to get side-tracked by defining poetry or the form of poetry I use here, but I feel a short description is necessary. Although we tend to know poetry when we read it, it remains something difficult to define. Definitions of poetry are “elusive, variable and highly personal” (Faulkner, 2005, p. 10). Over time, definitions of poetry have become less specific, and poetry no longer needs to be in the format of verse, nor requires the use of metre (Hunter, 2002). Free verse poetry is commonly associated with poets of the 20th century (Kirby-Smith, 1999) and involves a deviation from the formal use of metre, but may mix in metre and rhythm (Silkin, 1997). I find that the free verse style of poetry (which I use) permits for an unrestrained writing style and a less prescriptive approach. The use of poetry can be beneficial because it allows for a compressed showing, rather than telling (Faulkner, 2005) of the research phenomenon. Through its depth, richness and complexity, it is expected that poetry will create resonance and connectedness (Silkin, 1997) and engage the reader. Therefore, as the reader, we may become more immersed in the phenomenon and our understanding may be expanded, our thinking influenced and our practice reconceptualized.

Poetry is one way of disseminating the scientific knowledge and the experiential knowing derived from study of women’s recovery from heart surgery that may open up our way of thinking, and inspire a knowing that may otherwise be unknowable and elusive. Dissemination of knowledge about experiences requires us to capture the complexities of human experience in intelligible ways that do not foreclose on peoples’ experiences, but leaves room for, and invites inclusion of, further experiences. The dialogical character of poetry allows just this. As Pine (1996) suggests “poetry has the ability to point us toward the truth and then stand aside, while prose stands in the doorway relating all the wonders on the other side but rarely lets us pass” (p. xi). Furthermore, women’s recovery experiences from heart surgery are focused on the particular and the specific understandings of the experiential. Lawrence-Lightfoot (2005) suggests that, “the more specific, the more subtle the description, the more likely it is to evoke identification” (p. 13). The free verse style of

poetry used here allows me the freedom to be specific and address a range of experiences in a way that engages the reader.

The prose of traditional research dissemination tends to be directed at engaging the reader’s rational cognition and intellect. Morality, emotion and aesthetics (Richardson, 1994) may become more engaged in poetry because of the way that poetry invites the reader into the experience. Richardson (2000) quotes Robert Frost as saying “[poetry] is the shortest emotional distance between two points” (p.933). Poetry evokes a resonance in which the reader can come close to the poet’s emotional imagery of the phenomenon (Macbeth, 2001) and invites the reader to reflect on her/his own story. This emotional proximity to the research phenomenon can become embodied in the reader in ways that can stay with us beyond the reading of the poem, and may shift our thinking and fuse into our nursing practice. As Westcott (1991) suggests: “Poetry can continue to work its magic even in the absence of the poet. For the psychic ripples set in motion by the poet’s pebble have no predetermined limit: there is no end of selves to be created” (p. 168).

Disseminating research findings concerning women’s recovery experiences of heart surgery in the form of poetry is a novel and possibly effective method of sharing. The moral, aesthetic and emotional knowing, engaged in poetry as a method of dissemination may bridge the gap between research and practice, and between investigators and nurses, making evidence more available, understandable, effective and engaging.

Women’s Recovery Experiences

Evidence concerning women’s recovery experiences following open-heart surgery is important to consider for health care professionals involved in the care of people at all stages leading up to heart surgery and following heart surgery. The evidence can be instrumental to assessing, planning, intervening and considering women’s recovery experiences at all stages of care. It is suggested that unique and gendered experiences exist (Angus, 2001) and health care providers need to consider care from an interpretive framework (Hawthorne, 1993) that accounts for women’s everyday lives.

A first-person writing style from the perspective of women is used purposefully in this poetical dissemination to bring you closer to women’s experiences. However, it is important to be attentive to the multiple voices that come forth in this poetry, including multiple participants, multiple researchers, my voice and perhaps your own voice. What you read in the poetry is not necessarily the generalizable truth, but it is a (re)-presentation of the women’s subjective reality and a representation of the way that the women experience heart surgery recovery. Thus, their experience (as represented in the poetry) may not match the truth as

you experience it or the way you think about it. Further, the voices within this poetry may differ from each other because of the idiosyncratic nature of the experiences of heart surgery recovery. Nevertheless, an understanding of the phenomenon will hopefully emerge for you in ways that you may reconceptualize peoples' experiences and your own practice as a clinician, educator, administrator, researcher or academic in the arts and sciences of cardiovascular nursing.

At The "Heart" of Women's Recovery

Cracking open my sternum
fiddling with my heart
seeing an interior that is normally foreign
seeing a part of me that is normally
concealed
torn one way
torn the other
altering the very fibre of my being
sewing up this "womanly" body
changing me forever
sending me home to recover—

Repairing my heart
recovering the tangible
rectifying the uncertainty
re-casting self
-marked-
like no other
more than merely physical
an unparalleled muscle
the heart
the organ that houses life
existence
the beat-(less) of this muscle shifting
what once was
what will be

Invaded
shocked
repulsed
scarred
dignity ripped away
a self strayed
a self recovering
with time
with acceptance
fear –
fear of recurrence
fear of not being able to do what I used to
connecting with the future and
moving on
a transformational experience
capable of doing dishes
doing lots of things
haven't danced since my operation
sending me home to recover—

Swayed by my womanness
embodying an otherness orientation
gender
as such
framing my experiences
gendered
embodied
nothing less
imaginable
nothing less
conceivable.

Bound
by my location as a woman
always
these things affect my trajectory
fulfilling my social role
mother, wife, woman, lover
scarred
sense of self –
(dis)-harmonized
recovering
housekeeping
working
vulnerable
this is my recovery
healing in the present
recovery
spirituality
washing my kitchen floor
a major accomplishment
finding a balance
a new direction
my outlook on life
changed
a positive outlook
negative
positive
ambivalent
sending me home to recover –

Home
a sight of normality
everydayness
seeking understanding
recovering the recoverer
healing the healer
I do things for others
I cannot escape the immediacies of home
I cannot disembodify myself from being a
woman
and recover only
solely
sending me home to recover—

Helping me recover
without really knowing me
my home
my biography
my experiences
my relationships
my social locations
the spaces and places I inhabit
recovery that embraces the essence of self
recovery that includes healing
home—
a location for healing...
sending me home to recover—

Living
going on
a contracting world
a new normal
I will never be the same
a vulnerability shapes my present
approaching things with caution
longing for how it was
restoring a sense of normalcy and control
turning away from the prospect of my own
mortality to the routines of daily life
practically proper?
possible?
sending me home to recover –

Contemplate
incorporate
integrate
my standpoint—
my womanhood
my recovery
gendered
unique
considering the interface
women
recovery
home
Sending me home to recover –
Feeling better
looking positively to the future
judging my well-being
am I recovering?
physical symptoms
a major determinant
carrying on with my normal activities
I don't feel better
I'm having difficulties
frustration
depression
at odds with my body

my feelings
my family
my future
sending me home to recover.

Survived
relief
optimistic
a woman
-marked-
like no other
the heart
life
recast
vulnerable
awe
wonder
gratitude
survival
a matter of chance
grace
magic
limited to what I can do
continual fear
-recurrence-
a possibility
-marked-
sending me home to recover.

Regaining independence
getting older
living alone
personal freedom
contending with overprotective family
they have a fear of losing you
you know?
you know
resiliency
returning to my previous level of function
a serious disruption
in my young stage
my young age
my old age
anger
emotions
difficulties
coping
extra time
- graced -
the technological
life threatening
life altering
surgical procedure
left its mark
not merely physical
sending me home to recover.

Clothes
concealing
masking
but never forgetting it truly
the scars fade
time evolves
acceptance may emerge
healing
recovery
gendered
preserving my sense of self
in this womanly body
carrying on as normal
when I am no longer at home in my body
at odds in my own skin
obligated to go on
forgetting about it
not dwelling on it
dwelling on it
a catalyst to be better
an eventuality of the future recast -
a scar to remind me everyday
memories that nearly recede
a scar that never wanders
sending me home to recover

As I bring this poetical rendition to a close, I return to the question that framed my systematic review: What is the recovery experience like for women following open-heart surgery? Open-heart surgery was considered a serious experience by women (Allen & Wellard, 2001; Robinson, 2002) in which women's sense of self was affected by heart surgery (King & Jensen, 1994; Plach & Stevens, 2001). Some women declared that they will never be the same (Dingley, Bush, & Roux, 2001; King & Jensen, 1994), but many identified that it tends to become accepted over time (Allen & Wellard, 2001). Some women were resilient and focused on getting back to normal, whereas others focused on emotional issues and anger (Murray, O'Farrell, & Huston, 2000). Heart surgery was a disruption to women's present lives, but also a disruption to what they thought was their future. Women were not only at odds with their bodies, feelings and families, but with their anticipated futures (Plach & Stevens, 2001). King and Jensen (1994) found that women's recovery processes encompass a goal of "preserving the self" (p. 100) in which women learn to live with a new normal (Dingley, Bush & Roux, 2001) and try to come to some sense of understanding (Rosenfeld & Gilkeson, 2000). Women's social and material locations intersect with their recovery process (Angus, 2001), as women simultaneously struggle to recover and fulfil their roles, responsibilities and interpersonal relationships (Hawthorne, 1993; King & Jensen, 1994; Plach & Stevens, 2001). Hawthorne (1993) suggests that women embody an otherness orientation, which cannot necessarily be put on hold just because they have had

heart surgery. Although women felt they were living in a contracting world in which a vulnerability dominated, they also felt an obligation to move on, restore a sense of normalcy and control and carry on with the routines of daily life (Robinson, 2002). Women's experiences of heart surgery were complex, unique and idiosyncratic and shaped by the spaces and places that women inhabit. As health care professionals we may be aware of this, but we also need to attend to women's experiences.

Reviewing the existing research on women's recovery from heart surgery and crafting the above poem, I found that women's experiences of heart surgery recovery are unique and influenced by being a woman. Initially, you might think this is a given existence of the nature of being a woman, but this review of the research also revealed what heart surgery recovery is like for women and how recovery translates into their everyday lives. This understanding lends support to important areas for us to consider in our practices. Structuring my conclusions around a broad and inclusive understanding of evidence that includes not only research evidence, but also experience, expertise, intuition and theory, I maintain that the experience of recovery is gendered. The research evidence is not conclusive, nor is the research evidence sufficient to draw generalizable conclusions about this gendered experience. For example, the existing qualitative research that looks at the experiences of heart surgery rarely focuses on men (e.g., Bartz, 1988; Radley, 1996) and does so through a structured qualitative approach in which recovery and experiences are not a focal point. There is also a small collection of qualitative research exploring heart surgery experiences that include men in their samples (as well as women), but this research (Keller, 1991; Lukkarinen, 1999; Raholm, 2002) does not conduct a comparative analysis between men and women, and rarely identifies participants' gender and gendered life experiences within the analysis. For this reason, it remains speculative to say that recovery is gendered, based on the research evidence. Nevertheless, the studies of this systematic literature review have revealed an in-depth and rich understanding of women's experiences. Drawing from other types of evidence (e.g. expertise, intuition, experience, theory), I maintain that heart surgery recovery is a gendered experience, in which the spaces and places that women inhabit interface with their recovery experiences.

Future Issues:

Where Can the Road Lead Us Now?

I felt an urgency to share this poetry with other nurses and health care professionals in an effort to bring forth a different way of thinking and understanding. Further, to invite nurses to reconceptualize their practice in which a synergistic relationship can co-exist between the

cardiovascular sciences and the cardiovascular arts. There is a science and an art to cardiovascular practice. We tend to be more competent at understanding the science of our cardiovascular practice because the science of nursing is seen to be more tangible and is emphasized in our training and our practice. Nevertheless, the art of cardiovascular nursing is important to consider. The art of nursing can enhance “an understanding of how excellence can best be pursued and achieved in nursing practice” (Johnson, 1994, p. 2). This poetical rendition allows for our thinking to consider not only the science, but also the arts of cardiovascular nursing practice.

Furthering our understanding on how to utilize the arts and the sciences to frame our nursing practice demands that we recognize the implications for our practice. Women’s recovery from heart surgery has an idiosyncratic nature to it, in which we cannot draw grand conclusions about all women, but we can make tentative conclusions that may guide our cardiovascular practice. Reconceptualizing practice based on the arts and the sciences constructed in this article, suggests that it is important to consider women’s care from an interpretive framework in which biography is central to plan of care (Hawthorne, 1993). For this reason, the emerging evidence of women’s recovery experiences needs to be considered intelligently and then, tailored to each woman. As the art of nursing involves “knowledge, judgment, and skill” (Johnson, 1994) in our nursing practice, we need to exercise these in the application of evidence in practice and tailoring of plans of care. Theoretically, we know that assessments should be tailored to individuals and that assessments should be conducted at all phases of heart surgery in order to ensure that women’s needs are accounted for, but we need to ensure that this is what we are practising and document how we are practising it.

It is evident that women’s experiences are unique and complex, but have we changed our way of thinking, caring and practising to account for women’s

experiences? Future areas to consider in practice include: How do we enact care from a gendered perspective? How can we ensure that the health care system is accountable to women’s recovery experiences? What can we do as nurses to embrace a standpoint within our practice that honours women’s experiences? A domain of research that calls for attention is the need for a comparative analysis of recovery experiences of women and men. Moreover, research needs to be conducted into how health care professionals enact their practice in ways that account for the gendered experiences of heart surgery recovery.

I often hear nurses talking about the gap between research and practice, and I catch myself echoing this sentiment. I wonder if a synergistic relationship between the arts and the sciences is one way to bridge this gap. There are many ways of knowing that could inform our practice as nurses in the cardiovascular field. The limitations of science inspire us to consider other ways of knowing and poetry may help us to consider other ways of thinking, knowing and understanding within our nursing practice. Unconventional approaches to reframing the narrative voice of science can reawaken the art and the science of nursing and may bring us closer to an evidence-based approach to practice that accounts for the experiences of women recovering from heart surgery. ♥

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Gender of the Care Environment: Influence on Recovery in Women with Heart Disease

A. Kirsten Woodend, RN, MSc, PhD, and Gerald M. Devins, PhD

Women experience higher levels of distress than men (depression, anxiety, poor quality of life) after a first myocardial infarction. Sex differences in distress are not present in predominantly female diseases such as arthritis. This study explored the possibility that the predominantly male treatment environment for heart disease accounted for some of the sex differences in distress.

Methods: Men and women who had experienced a first-MI were asked to complete the Bem Sex Role Inventory (BSRI), a modified version of the Moos Ward Atmosphere Scale (WAS) and measures of illness intrusiveness, depression, anxiety and quality of life. Gender syntony was defined as a match between patient gender (BSRI) and the perceived gender of the treatment environment (WAS).

Results: Women experienced higher levels of distress than men and were more likely to experience discordance between their gender and the perceived gender of the care environment (73% of women versus 32% of men). The presence of gender dystony (a mismatch between gender and treatment environment) was related to higher levels of illness intrusiveness and overall distress.

Conclusions: Modification of the heart disease treatment environment so that it better meets the needs of women may reduce sex differences in distress.

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Background

Cardiovascular disease (CVD) is a leading cause of mortality and morbidity in women and rates of CVD for women are similar to those for men. With 175 out of 100,000 Canadian women dying of CVD each year, it is the number one health threat to the adult female (Manuel et al., 2003). In the Framingham Heart Study, 40% of all coronary events occurred in women and, by 75 years of age, coronary morbidity was comparable between men and women (Wenger, 1993). The lifetime risk for a woman experiencing a coronary heart disease (CHD) event is 24 to 32%, a threefold greater chance than developing breast cancer (seven to 12.5%).

Emotional distress is common in heart disease and is more prevalent than in most other chronic diseases (Katon & Sullivan, 1990; Palinkas, Wingard, & Barrett-Connor, 1990; Stewart, Greenfield, & Hays, 1989) and in the general population. In heart disease,

emotional distress is most commonly manifested as depression, anxiety and diminished "quality of life" (Havik & Maeland, 1990; Trelawny-Ross & Russel, 1987). The presence of emotional distress results in increased mortality and morbidity (Carney et al., 1988; Ladwig, Roll, Breithardt, Budde, & Borggreffe, 1994). Distress is also associated with decreased global functioning (Talo, Hamalainen, Kervila, & Kallio, 1995). Following myocardial infarction (MI), major depression, depressive symptoms and anxiety predict subsequent cardiac events (Frasure-Smith, Lesperance, & Talajic, 1995b).

Women with heart disease, especially those who have had myocardial infarctions (MI), experience more distress than do men. Most of the MI studies that present data on sex differences in depression report significant differences with women having more depressive symptoms and/or a higher prevalence of depression than men (Schleifer et al., 1989; Conn &

Abele, 1991; Frasure-Smith, Lesperance, & Talajic, 1995a). A similar pattern of sex differences in anxiety has been demonstrated (Conn, Taylor, & Wiman, 1991; Wiklund et al., 1993; Uuskula, 1996; Kim et al., 2000). Post-MI women also report a poorer quality of life than do men (Wiklund, Herlitz, & Hjalmarson, 1989; Shumaker et al., 1997).

How do we explain women's higher levels of distress after an MI? Women in the general population report higher rates of depression and anxiety and lower quality of life than men (Nolen-Hoeksema, 1990; Wilhelm, Parker, & Hadzi-Pavlovic, 1997). These differences diminish and, in one study, disappear after the age of 55, the age at which rates of heart disease rise markedly (Nolen-Hoeksema, 1990; Lennon, 1998; Bebbington, 1998). In many other chronic disease populations, other than heart disease, sex differences in psychosocial well-being are much smaller than in heart disease populations (Hopwood & Stephens, 2000; Dugan et al., 1998; Brown et al., 2000; Creamer et al., 1999).

Women with heart disease are generally older than men and have more co-morbid illnesses but, when studies have controlled for these covariates, sex differences in distress remain. An alternative explanation is that women's increased vulnerability to distress is attributable to differences in the availability of treatment and resources that support coping with heart disease as well as different role burdens experienced during recovery. Medically, women are treated less aggressively than men. Sex differences in distress are partially explained by sex differences in role strains and resources for coping, but sex differences in these variables also occur in other chronic disease populations. Role strains and resources for coping do not appear to explain why sex differences are larger and more consistent in heart disease than in other chronic disease populations.

There is a long-standing tradition of considering heart disease to be a "man's disease". Despite the fact that half the persons who die of heart disease are women, women make up only 23% of the patients being discharged from hospital. A treatment environment that cares for patients who are predominantly male and who suffer from what has been considered a "man's disease" would naturally evolve to address the needs of the population it serves: a male population (Wicker, 1987).

Work completed in the 1970s on 'person-environment' fit (P-E fit) suggested that the fit between a person's unique characteristics and his/her environment determines who will and who will not experience stress (Bowers, 1973; Kahana,

1975). Most of the research on person-environment fit has been done in the workplace, but some recent studies have used the concept of person-environment fit to explain why elderly persons 'cope' better in certain environments (Iwarsson, 2005; Dooley & Hinojosa, 2004). A number of P-E frameworks exist and the most well-known is Lawton and Nahemow's Ecological Model of Aging (Lawton & Nahemow, 1973). This framework focuses on the interaction between the demands of the environment and a person's competence. In a later version of the model, the parameters were revised and became personal and environmental resources (Lawton, 1998). A patient's adaptive behaviour is a function of both their personal characteristics and environmental characteristics with the nature of their response being dependent on their personal competence or personal resources (Lawton, 1982). Adaptation occurs within a range where environmental resources closely balance personal resources such that the awareness of environmental stimuli (stressors) is minimal (Lawton et al., 1973; Lawton, 1998). The 'fit' between the older person's environment and their personal characteristics and needs does predict well-being (Dooley et al., 2004; Iwarsson, 2005). The resources (social support, finances, self-efficacy etc.) that an individual has to draw on in times of stress or crisis influence the effect these stressors have on an individual's well-being (Hobfoll, 2002).

Gender describes socially constructed characteristics of men and women. It refers to a set of qualities and behaviours expected from a female or male by society. These roles are learned, change over time and vary widely within and among cultures. Women are stereotypically considered to be gentler, more sympathetic and sensitive to others' needs than men (Bem, 1974). Men are stereotypically more analytic, practically oriented and ambitious than women (Bem, 1974). Women tend to use more emotion-focused coping than men (Billings & Moos, 1982) and women with heart disease want more opportunities to discuss their progress (Moore & Kramer, 1996) and to 'share and compare' with other women (Woodend, Kerr, Adam, & Nursing Working Group on Heart Health for Women, 2000).

Men and women, with their differing resources, may respond differently to the same health care environment. The heart disease treatment environment, which has traditionally catered to men, may 'fit' poorly for women, explaining why sex differences in distress are greater in this population. "Gender syntony" is the term we will use to refer to a match between the patient's gender and the patient's

perception of the care providers' approach and type of treatment offered (e.g., active problem solving versus nurturant/supportive). Its reverse, a mismatch, will be termed "gender dystony." Individuals and treatment environments may interact in different ways. Two patients may have differing perceptions of the same environment and even when patients' perceptions of a treatment environment are similar, their affective and adaptive responses may differ (Kiritz & Moos, 1974; Kahana, Lovegreen, Kahana, & Kahana, 2003).

Heart disease has been stereotyped as a 'man's' disease. Cardiologists and cardiac surgeons are primarily male. Patients seeing female physicians are generally more satisfied, but this is particularly pronounced among female patients (Bertakis, 1998). There may be subtle or overt aspects of the treatment milieu, or the treatment itself, that 'fit' men's preferred coping styles better than those of women. Cardiology clinics are busy. In teaching centres, patients are often examined by unfamiliar, temporary staff (residents and interns); they may have only a few minutes to discuss their progress with the cardiologist. Cardiac rehabilitation programs traditionally involve exercise and teaching, but do not formally incorporate time for patients to talk and share information or support with 'classmates'. There may be more subtle and immeasurable ways in which the treatment environment and treatment plan are more oriented to men's than women's needs as a result of serving a dominantly male population for many years.

An extensive literature addresses the relationship between physicians and their patients, including communication and whether the match (or mismatch) between the sex of physicians and their patients alters communication during the treatment situation. Office visits are usually longer for women as compared to men and women tend both to talk more and to present a higher number of complaints per visit (Meeuwesen & Schaap, 1991; Bensing, van der Brink-Muinen, & de Bakker, 2005). Female patients are emotionally more expressive in interactions with their physician visits as compared to male patients (Hall & Roter, 1998; Hooper, 1982; Kaplan & Greenfield, 1991). They are also more likely to report that the physician "talked down to them" or treated them like children (Lennon, 1998).

Most of these studies were conducted in general practice settings where females are much more likely to present than are males. This is very different from the cardiac care setting where approximately three-quarters of the patients are male. One might speculate that the physician's style

in providing care may evolve to address the needs of the majority population they serve. Thus, in the family practice setting, the style of delivering care may evolve to cater to women whereas in the cardiology service, it may develop more in line with masculine needs and preferences. Although intriguing, these issues have not yet been investigated in the literature concerning doctor-patient relationships or communication.

There has been no published research on the relative 'fit' of the heart disease treatment environment for men as compared to women, but some studies lend support to this hypothesis. Women enrol less often in cardiac rehabilitation programs than men and drop out more often (O'Callaghan et al., 1984; Ades, Waldmann, McCann, & Weaver, 1992; McGee & Horgan, 1992; Ades, Waldmann, Polk, & Coflesky, 1992). These programs are active, usually including an exercise component, education sessions and stress management. The preferences of female cardiac rehabilitation participants to "choose their own exercises", "discuss their progress", "not tire", have "flexible hours" and "set their own goals" are not well-met (Moore et al., 1996). Since women use more emotion-focused coping than men (Billings et al., 1982), the standard approach to rehabilitation emphasizing action and problem-focused adaptation may conflict with women's coping styles.

Additional evidence in support of the gender syntony concept is the observed relation between the presence of gender differences in distress in a chronic disease and the ratio of men to women with that disease. Treatment environments that have traditionally cared for large numbers of women are more likely to have adapted to meet the care needs of those women. For instance, more women than men have arthritis, therefore we would anticipate that these care environments would be structured to meet the needs of the women it serves, potentially reducing their distress. The ratio of males to females discharged from hospital with the diagnosis of an MI is about 3:1. The heart-disease treatment environment is therefore likely to have structured itself to meet the needs of that dominantly male population and, consequently, is less likely to meet the care needs of women, increasing their distress. The literature supports this contention. In most heart disease studies, women are more distressed than men, whereas fewer sex differences in distress are found in illnesses such as arthritis, where the patients are predominantly female (Creamer et al., 1999; Soderlin, Hakala, & Nieminen, 2000). Female sex has also been found not to correlate with distress in other diseases in which the male to female ratio is

closer to 1:1 (Hopwood et al., 2000; Dugan et al., 1998; Lloyd, Dyer, & Barnett, 2000; Kimmel, Thamer, Richard, & Ray, 1998).

The objective of this research was to explore the concept of gender syntony and its relationship to illness intrusiveness and distress after a first myocardial infarction.

Methods

This study was part of a larger, cross-sectional survey of patients following their first myocardial infarction. The protocol was reviewed and approved by the University of Ottawa Heart Institute's Human Research Ethics Board and by the ethics boards of the Sunnybrook Health Science Centre and St Michael's Hospital in Toronto. Patients were contacted by telephone three to six months after hospital discharge and permission to mail the questionnaire package was obtained. Questionnaires were to be completed no earlier than three months after discharge and no later than six months. Demographic, disease and treatment information was abstracted from the hospital record corresponding to the index MI admission.

Subjects

All patients discharged from the University of Ottawa Heart Institute with a diagnosis of first MI were screened for eligibility. The diagnosis of MI was based on the following criteria:

- a) chest pain of longer than 30 minutes' duration characteristic of myocardial ischemia,
- b) elevation of total creatinine kinase level to at least twice the upper limit of normal, and
- c) a positive creatinine kinase-MB band or positive troponin-t.

Patients were considered for inclusion if they met the following criteria:

- 1) confirmed MI,
- 2) between the ages of 55 and 75 years, inclusive,
- 3) able to read and write English, and
- 4) provided informed consent.

Patients were excluded if they:

- 1) had a prior MI, or
- 2) were hospitalized at the time of the interview (three to six months post-MI).

Initially, inpatient units and cardiology clinic charts were screened for eligible patients.

Outcome measures

The Illness Intrusiveness Ratings Scale (IIRS) is a 13-item (Devins et al., 1990a), self-administered measure of the degree to which one's illness and/or treatment disrupt each of 13 life domains.

Respondents indicate the degree of disruption on a seven-point scale ranging from 'not very much' to 'very much'. The construct validity and internal consistency have been demonstrated in a number of chronically ill populations (Devins et al., 1990b; Devins et al., 1990a; Devins, Edworthy, Guthrie, & Martin, 1992; Devins et al., 1983; Devins, Seland, Klein, Edworthy, & Saary, 1993). Internal consistency reliability (Cronbach's alpha) ranges from 0.79 to 0.90. In addition to a total score, the IIRS comprises three subscales: relationships and personal development, intimacy and instrumental life domains. The stability of the three-factor structure of the IIRS was confirmed using exploratory and confirmatory factor analysis in eight chronic disease groups. The alpha coefficients for the total IIRS score and each of the subscales were high (total score 0.90, relationships and personal development 0.84, intimacy 0.82 and instrumental 0.83) (Devins et al., 2001).

Distress included depressive symptoms, anxiety and quality of life as measured by the vitality and mental health subscales of the SF-36. The Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) was used to assess depressive symptoms. It is a 20-item self-administered questionnaire with high internal consistency (0.84 to 0.90) and adequate test-retest reliability (0.51 to 0.67). The CES-D has been validated and used in healthy and chronically ill populations (Devins & Orme, 1985; Devins et al., 1988; Hann, Winter, & Jacobsen, 1999).

Anxiety was measured using the Beck Anxiety Inventory (BAI) (Beck, 1990; Beck, Brown, Epstein, & Steer, 1988), a 21-item self-administered questionnaire that assesses generalized anxiety. The inventory has high internal consistency reliability ($\alpha=0.90$ to 0.92) (Beck et al., 1988; Creamer, Foran, & Bell, 1995) and a one-week test-retest reliability of 0.75. Its construct validity has been supported (Osman, Kopper, Barrios, Osman, & Wade, 1997).

Two subscales (vitality and mental health) of the Medical Outcomes Study Short Form - 36 (SF-36) 263 were used to assess quality of life. The vitality subscale measures physical and mental well-being and includes questions such as "Did you feel full of pep?" The mental health subscale measures mental function and well-being. It includes items such as "Have you felt calm and peaceful?" The SF-36 has been extensively used and validated in both well and chronically ill populations (McHorney, Ware, & Raczek, 1993; McHorney, Rogers, Raczek, & Lu, 1992).

Principle-components factor analysis reduced the four

measures of distress to one variable, labelled 'distress'. This generated a single principle component with an eigenvalue of 2.76, accounting for 69% of the variance in the four measures. Factor loadings and communalities were as follows: (a) vitality (loading = -.74, communality = .54), (b) mental health (loading = -.88, communality = .77), (c) anxiety (loading = .80, communality = .64) and (d) depression (loading = .90, communality = .80). Factor scores were calculated and have a mean of 0 and a variance of 1. Higher scores indicate higher levels of distress.

Gender syntony was defined as a match between the patient's gender and the care providers' approach to treatment (e.g., active problem-solving versus nurturant/supportive). Patient gender was measured by the Bem Sex Role Inventory (BSRI) (Bem, 1974). Treatment atmosphere was measured using a modified version of the Ward Atmosphere Scale (Moos, 1974). The Bem Sex Role Inventory (BSRI) is a 60-item, self-administered scale that lists 20 masculine, 20 feminine and 20 neutral characteristics. The scale has been validated and used primarily in healthy populations (Bem, 1974; Bem, 1977; Robinson, Shaver, & Wrightsman, 1990). The internal consistency reliability of each of the subscales (Cronbach's alpha) are: masculinity 0.86, femininity 0.89-0.82 and androgyny 0.85. The test-retest reliability for each of the subscales is: masculinity 0.90, femininity 0.90 and androgyny 0.93.

The Ward Atmosphere Scale (WAS) was originally developed to assess the social environment of psychiatric wards as perceived by staff and patients. It comprises 10 subscales and has been shown to be both valid and reliable (Moos, 1974; Moos & Houts, 1968; Kiritz et al., 1974). Only four of the WAS subscales were used in this study: two that measured aspects of the environment and that are congruous with stereotypically feminine attributes (support, personal problem orientation), and two with stereotypically masculine attributes (practical orientation, order and organization). Some of the 40 questions within these four subscales were modified to make them more applicable in the outpatient, heart-disease treatment setting. Items that did not refer to a specific treatment setting, such as "The staff act on patient suggestions" and "New treatment approaches are often tried," remained unmodified. Items that included a treatment setting were modified to reflect the cardiac treatment setting (e.g., "There is very little emphasis on teaching patients solutions to the practical problems of living with 'heart disease'").

Analysis

The standard method was used to score the BSRI. Separate scores were derived for masculinity, femininity and androgyny. The femininity score was subtracted from the masculinity score to

	Females	Males	p
Age (mean±SD)	65.3±9.5	65.47±6.1	ns
Grade Comorbidity [n(%)]			
None-mild	66 (89%)	92 (87%)	ns
Moderate-severe	8 (11%)	14 (13%)	
Angiogram [n(%)]	61 (87%)	90 (88%)	ns
Revascularization (CABG or PTCA)	43 (62%)	81 (79%)	.01
Attend cardiac rehabilitation? [n(%)]	27 (37%)	38 (37%)	ns
Illness Intrusiveness	32.6±15.2	32.0±13.5	ns
Depression [mean(SD)]	16.91±10.37	10.61±8.79	<.001
Anxiety [mean (SD)]	10.44±8.58	7.94±8.89	.058
Quality of Life			
Vitality	67.61±20.56	46.13±19.24	.002
Mental health	75.64±16.77	55.18±20.63	.002
Distress score (composite)[mean(SD)]	0.33±0.99	-0.23±0.95	<.001

obtain a difference score, ranging from -7 to +7. Negative scores indicate that the patient scored higher on the masculinity than the femininity score and vice versa for positive scores. The scores for the two stereotypically masculine WAS subscales (practical orientation and order and organization) were summed to obtain a “masculine environment” score. In the same manner, the two stereotypically feminine subscales of the WAS (support and personal problem orientation) were summed to obtain a “feminine environment” score. The “feminine environment” score was subtracted from the “masculine environment” score to obtain a difference score ranging from -20 to +20. A categorical approach was adopted to measure gender dystony (presence versus absence) because the BSRI and the WAS use very different metrics. Patients with opposite signs on the difference scores of the BSRI and the WAS were considered to be experiencing gender dystony (i.e., a mismatch between their gender and their perceived gender orientation of the treatment environment).

Means and frequencies were calculated to describe the subjects. Chi-squared and independent t-tests were used to test for sex differences in demographic variables, medical history and treatment. Independent t-tests were used to test for differences in illness intrusiveness and distress in patients experiencing gender dystony and those who did not. Factorial analysis of variance was used to examine the effect of gender dystony and sex on distress.

	Syntony	Dystony	P
Women (%)	21%	59%	<.001
Illness Intrusiveness	2.38±0.95	2.72±1.20	.05
Depression [mean(SD)]	10.91±10.91	16.77±10.54	<.001
Anxiety [mean (SD)]	8.10±8.82	10.46±8.38	ns
Quality of Life			
Vitality	53.10±21.11	47.93±19.09	ns
Mental health	74.06±18.30	68.03±18.68	.04
Distress score (composite) [mean(SD)]	-0.16±0.99	0.28±0.98	.006

Results

Questionnaires were mailed to 328 consenting patients and 227 were returned (69%). Of these, 38 were excluded because evidence of a previous MI was discovered on closer review of the hospital chart. Approximately 50% of all patients discharged with diagnosis of an MI (ICD-9 code 410) met the study’s age criteria; of these, 95% were discharged live and 23% were female. The patients who consented to receive questionnaires represent 32% of all patients discharged (live or dead) with the diagnosis of an MI. The final analysis included 77 women (41%) and 112 men.

The mean ages of men and women did not differ significantly, nor did they differ significantly in the extent of their comorbidity (Table 1). Women were less likely than men to have college or university education ($p < .001$) and were more likely to have a household income of less than \$20,000 per annum ($p = .03$). The mean time from MI to questionnaire completion was 4.4 months and did not differ significantly between men and women. More men than women underwent a revascularization procedure ($p = 0.01$) prior to questionnaire completion. Women also had more depressive symptoms, poorer quality of life and more distress (composite distress score) than men.

Gender dystony (mismatch between the patient’s gender and his/her perceived gender orientation of the environment) was present in 73% of women as compared to 32% of men ($p < 0.005$) (Table 2). Although the proportion of patients experiencing gender dystony did not vary by level of education, 70% of those with an income of less than \$20,000 experienced gender dystony as compared to 40% of those with higher incomes ($p = .003$). Since income was related to the presence of gender dystony, a logistic regression analysis was done, regressing income and sex, in a stepwise fashion, on gender dystony. The difference in fit between the models with income, alone, as compared to income and sex, included was significant ($\chi^2 = 18.51, p < .05$) indicating that sex is a significant predictor of gender dystony after accounting for sex differences in income.

Patients reporting gender dystony reported higher levels of overall illness intrusiveness (2.72±1.20) than those who did not (2.38±.95) ($t = 1.964, p = .05$). Gender dystonic patients also reported higher levels of illness intrusiveness on the relationships and personal development subscale (2.34 ±1.31 versus 1.82±.85, $t = 2.96, p = .004$). Patients with gender dystony reported higher levels of distress (0.28±.98) than patients who did not (-0.16±.99, $p = .006$).

The effect of gender dystony and sex on distress was examined using factorial analysis of variance. There was no significant interaction between sex and gender dystony ($F_{1,151} = .007, p = ns$). There were significant main effects for sex ($F_{1,151} = 932.96, p = .021$) or gender syntony ($F_{1,151} = 341.74, p = .034$). Men without gender dystony reported the lowest levels of distress of all groups examined and women with gender dystony reported the highest levels. Post-hoc testing demonstrated that the mean distress scores of gender syntonic males were significantly lower than those of gender syntonic and dystonic females ($p < .05$) (Figure 1).

To clarify the role of gender and gender dystony in post-MI distress, the relationships among gender, sex, illness intrusiveness and distress were explored further. Patients were coded as “androgynous,” “feminine,” or “masculine” typed based on their BSRI scores. An analysis of variance tested the relationship between gender and distress regardless of biological sex. Patients categorized as ‘masculine’ ($n = 27$) reported the lowest levels of distress ($-.29 \pm .82$) whereas ‘feminine’ patients ($n = 24$) reported the highest levels ($.72 \pm 1.16$). Androgynous patients were in the majority ($n = 124$) and reported scores between those of the masculine and feminine typed respondents ($-.07 \pm .97$) with a significant overall $F_{2,177} = 7.74, p < .005$. This contrast was not significant when illness intrusiveness was the dependent variable. Because the strong correlation between sex and gender may have been confounding this analysis, a factorial analysis of variance was done including sex as an independent variable. The numbers in some of the groups were small and the overall F was non-

significant. There was a trend for ‘feminine’ men to be more distressed than ‘androgynous’ men or ‘masculine men’. There was also a trend for ‘androgynous’ women to be the least distressed among women.

Bivariate correlations were computed to examine the relationship between treatment atmosphere, as measured by the four modified scales of the WAS, and distress. The only significant correlations with distress were for the WAS Support subscale ($r = -.164, p = .04$) and the practical orientation subscale ($r = -.182, p = .02$). When patients described the treatment environment as more supportive or more practically oriented, they reported lower levels of distress.

Men’s and women’s scores for each of the four scales of the WAS were compared using independent t-tests. Scores for the support and practical orientation subscales differed significantly, with men rating both characteristics of the environment more highly than women (Table 3). Two aspects of the treatment environment (support and practical orientation) were significantly correlated with levels of distress. Men and women differed in their assessment of these same two aspects of the treatment environment.

Conclusions/Discussion

Women report more distress after an MI than men. There is a long-standing tradition that considers heart disease to be a “man’s disease”. A treatment environment that cares for patients who are predominantly male and who suffer from what has been considered a “man’s disease” would naturally evolve to address the needs of the population it serves: a male population (Wicker, 1987). The Ecological Model of Aging proposes that adaptation and, therefore, stress is determined by person-environment fit (Lawton et al.,

Figure 1

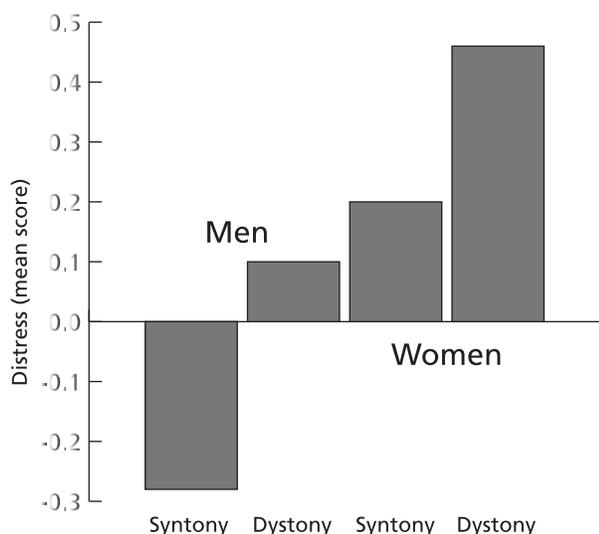


Table 3
Scores on Modified Ward Atmosphere Scale by sex

	Women Mean \pm SD	Men Mean \pm SD	p
Feminine			
Support	5.50 \pm 2.45	6.47 \pm 2.50	0.016
Personal Problem Orientation	3.00 \pm 2.11	3.52 \pm 2.34	ns
Masculine			
Autonomy	7.33 \pm 1.75	7.46 \pm 1.65	ns
Practical Orientation	6.91 \pm 2.04	7.50 \pm 1.85	0.058

1973; Lawton, 1998; Lawton, 1982). There are two ways in which the characteristics of the treatment environment might interact with a patient's characteristics (in this case, those associated with gender) to influence resources for coping and, consequently, the outcomes of the coping process. First, the treatment environment provides some resources that may or may not be beneficial to the patient. For instance, a treatment environment that focuses on supporting patient autonomy, but not providing opportunities for the patients to share personal problems, might provide resources that are less beneficial to patients of female gender than those of male gender. Second, the treatment environment, itself, may act as a background in which resources that the patient brings (i.e., social support, self efficacy, self esteem) may or may not be beneficial (French, Rodgers, & Cobb, 1974). Assuming that women's care and recovery needs and the coping resources they bring to the tasks of recovery differ from men's, a treatment environment better suited to meet the needs of men would be unlikely to perform as well in meeting women's needs.

Women in this study were more likely than men to experience discordance between their self-reported gender and their perception of the care providers' approach to treatment (gender dystony). Patients reporting gender dystony experienced higher levels of illness intrusiveness and distress than gender syntonic patients. Assuming that women's care and recovery needs are different than men's, a treatment environment designed to meet the needs of men would be unlikely to perform as well in meeting women's needs. In addition, the "lack of fit" of a male-centred treatment environment may contribute to women's distress. Although both gender syntonic and dystonic women experienced higher levels of distress than men, within each sex, gender dystonic patients had higher levels of distress than gender syntonic patients.

Sex moderated the effect of gender dystony on illness intrusiveness. Gender syntonic males reported lower levels of intrusiveness than gender syntonic females and gender dystonic males had higher levels of intrusiveness than gender dystonic females. Both of these interactions must be interpreted with caution since these were two from a large number of interactions that were tested. The level of significance that would need to be met to maintain the family-wise alpha of this group of tests at 0.05 was .007. The p-values for both of these interactions did not meet that criterion. A significant proportion of the men in this study (32%) reported gender dystony. Most of these (90%) had more female than male gender traits and perceived the treatment environment to have more

masculine than feminine characteristics. Gender dystony in men increased levels of distress, but not to the same level as those experienced by women.

The question arises: Do sex roles still apply? The logic underlying our use of the Bem Sex Role Inventory and the four scales selected from the Ward Atmosphere Scale is predicated on the assumption that gender stereotypes do apply. With an increasing number of women moving into the workforce, and some men adopting homemaking and caregiving roles, the question is valid. Martine Rothblatt (1996) has said that:

Fundamentally, sexual identity has been recognized from the beginning of consciousness to consist of three elements: activeness (or aggression), passiveness (or nurturing) and eroticism (or sex drive).

Over time, the changing roles of men and women, and especially those of women, may have altered gender stereotypes (Diekman & Eagly, 2000). Harris (1994) surveyed 3,000 mall shoppers and confirmed that 19 of the 20 masculine traits and 17 of the feminine traits used in the Bem Sex Role Inventory were still valid (considered desirable for men and women). Auster and Ohm (2000) conducted a similar study among college students. In this study, 18 of the 20 feminine traits were still considered valid, but only eight of the 20 traits qualified as masculine. Auster and Ohm concluded that "although societal changes may have taken place, they are not reflected in these male and female respondents' perceptions of how desirable it is...for a man" or "for a woman" to possess particular traits" (p. 524). Since the population in which this study was conducted was older, the results of the Harris study more likely reflect the attitudes of the population under study. Sex roles still apply.

Limitations

The exploratory nature of the final hypothesis and the lack of existing tools to measure gender dystony require caution in drawing conclusions from this research. There was strong statistical support for the hypothesis that women experienced distress because of a poor fit between their gender and gender-stereotyped care needs. The concept of person-environment fit has been studied for at least three decades in both work and psychiatric care environments. No published work could be found on the assessment of traits of other care environments. As a result, four of the 10 scales comprising the Moos WAS were selected and modified to measure stereotypically gendered aspects of the care environment. These four (support, personal problem orientation, practical orientation, order and organization) were selected because they were similar to non-gender neutral items in the Bem Sex Role

Inventory. It is possible that other aspects of the care environment are important to women and/or men and should be included here.

Implications and Future Research

It appears there is a need to modify the treatment environment so that it better meets the needs of women. This might help to reduce the levels of distress that women experience after an MI. It might also decrease distress in most of the smaller proportion of men who experience gender dystony. Increasing the supportive aspects of the treatment environment as well as its personal problem orientation would produce an environment that is more conducive to women's adaptation and coping with heart disease. Evidence to suggest that these changes would make the treatment environment more suitable for women comes from the present study, two studies by Moore (Moore et al., 1996; Moore, 1996) and a series of focus groups conducted at the University of Ottawa Heart Institute (Woodend et al., 2000). Moore and Kramer (Moore et al., 1996) surveyed men and women participating in a cardiac rehabilitation program about their preferences. Both men and women felt they did not have ample opportunity to discuss their progress with professionals. Men wanted greater freedom to set their own goals and women preferred not having pain and not tiring while exercising. Moore (1996) also conducted a focus group of women participating in cardiac rehabilitation to find out more about women's attitudes and preferences regarding cardiac rehabilitation. The women said they wanted more opportunities for social interaction during the exercise sessions and more emotional support from staff members about all dimensions of cardiac recovery. This was similar to themes that frequently emerged in the series of focus groups conducted by Woodend et al. (2000). Women wanted a forum in which to meet other women with similar health problems to do what they identified as "sharing and comparing." At present,

such forums are rare. Most heart disease treatment settings, such as cardiology clinics or wards, with their rapid patient turnover do not provide women with opportunities for this type of exchange and mutual support.

This research concerning the concept of gender dystony was exploratory. Further work is required to clarify the concept. This should begin with an emphasis on measurement and validation of the approach. One way to improve the measurement of gender dystony (or the assessment of the care environment) is through focus groups or a survey format to identify aspects of the care environment that patients consider most important. It may well be that the four aspects examined in this study do not comprehensively reflect aspects of care that influence the patients' ability to cope during the recovery period. The concept of gender dystony and its impact on psychosocial well-being should be studied in other populations where sex differences are smaller, not detected, or reversed to determine whether the findings are consistent with the sex differences in distress in those populations.

More recent work on the person-environment fit model has suggested that a more complex model, which takes into account a broader range of environmental resources (structural, social support, service support) as well as a person's assessment of their priority, better predicts well-being (Cvitkovich & Wister, 2000; Kahana, et al., 2003). It is important that, as nurses, we consider in both our research and our patient care, not only the characteristics of the patient, but the characteristics of the environment in which they are receiving care and how these can be better matched to improve patient well-being. ♥

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Women's Cardiac Rehabilitation: Improving Access Using Principles of Women's Health

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There is growing awareness among health care providers, government and community organizations that sex and gender are relevant to issues of health. Cardiovascular disease (CVD) is one area that has been in the spotlight with respect to sex and gender differences. The myth that CVD is a 'man's disease' has been thoroughly debunked and it is now acknowledged that CVD is the number one killer of women in Canada. Despite this, cardiac rehabilitation (CR) programs are largely under-utilized by women.

This paper presents a case study of a CR program in Toronto and describes how one hospital has used their Principles of Women's Health to address barriers to CR for women. The Principles of Women's Health are described, program elements that embody these principles are reviewed and implications for the future of CR for women are discussed.

Key words: women's health, rehabilitation, cardiac, preventive health care, health care accessibility

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Introduction

Interest in women with cardiovascular disease (CVD) has been growing since the mid 1980s (King & Paul, 1996). Currently, CVD is the primary killer of women in Canada and accounts for more than 40,000 deaths per year, more than all forms of cancer combined (American Heart Association, 2004; Heart and Stroke Foundation of Canada, 2003). Though the incidence of CVD among women aged 40 to 50 years is lower than among men, it rises sharply after menopause (between 60 and 70 years of age) and equals the incidence among men (Lerner & Kannel, 1986). As a result, one-half of all deaths due to CVD now occur in women. More disturbing is the fact that once CVD is clinically manifested, women experience worse outcomes, with more symptomatic angina and higher mortality rates following myocardial infarction (MI), coronary artery bypass graft (CABG) and angioplasty (Wenger, 2004).

The latest American Heart Association guidelines for the prevention and treatment of CVD in women include referral to cardiac rehabilitation (CR) (Mosca et al., 2004), as it has been shown to be an effective intervention for both men and women and is considered an essential component of care for all patients with CVD (American Heart Association, 1994; Stone, 2001). A recent Cochrane review confirmed a 27% reduction in all-cause mortality with exercise-based CR (Jolliffe et al., 2001). Though the benefits are well-substantiated, CR is still largely under-utilized (Canadian Association of Cardiac Rehabilitation, 2004), with women comprising only three to 15% of contemporary CR programs (O'Connor et al., 1989;

Oldridge, 1988; Schuster & Waldron, 1991). Current evidence suggests that once enrolled in a CR program, women have high drop-out rates and often do not continue with healthy exercise regimens following completion of a formal CR program (Fleury, Lee, Matteson, & Belyea, 2004; Halm, Penque, Doll, & Beahrs, 1999; King & Teo, 1998; Moore, Ruland, Pashkow, & Blackburn, 1998; Oldridge, 1991). Several studies have examined barriers to women participating in CR programs. Ades, Waldmann, McCann and Weaver (1992) and Halm et al. (1999) report that physicians are less likely to refer women to CR. Other studies have identified commute time, denial of disease, depression and financial issues as barriers for women participating in CR (Ades, Waldmann, McCann, et al., 1992; Ades, Waldmann, Polk, & Coflesky, 1992; McSweeney & Crane, 2001). As early as 1986, Wenger (2004) called for specific CR intervention strategies for women to be developed and evaluated. The purpose of this paper is to present a case study of a women-only CR program in Toronto, Canada, and to describe how one hospital has used its Principles of Women's Health to address women's barriers to CR.

Women and Cardiac Rehabilitation Participation

CR programs that consider the needs of women may involve significant differences from traditional CR programs as these programs have most often been developed for middle-aged men (Limacher, 1998). Direction and recommendations for female CR program development is limited, however, because

research on the benefits of CR for women is limited and meta-analyses of women's participation are unavailable due to inadequate sample size (Gallagher, McKinley, & Dracup, 2003; Jackson, Leclerc, Erskine, & Linden, 2005; Jolliffe et al., 2001). At present, it is unfortunate to report that female gender, in and of itself, is one of the strongest predictors of poor CR attendance (Daly et al., 2002). Despite higher eligibility rates for CR among women, fewer women than men receive referrals to CR, and of the women who do attend, adherence and dropout rates are much higher among women compared to men (Gallagher et al., 2003; Halm et al., 1999; Jackson et al., 2005).

The most comprehensive review of the literature to date on predictors of CR referral and adherence involved a quantitative review of 32 separate studies to identify gender-specific predictors of CR referral, program adherence and adherence to lifestyle recommendations following CR completion (Jackson et al., 2005). This review reports that the strongest predictors of ongoing CR participation are physician endorsement, ease of physical access and transportation, high self-efficacy, high social support, high socioeconomic status and high education. Non-participation is greater among women and is attributed to long distance to CR, lack of insurance coverage, family obligations and role resumption. Significant gender differences include decreased participation among women who were married, and among patients who were older, obese and lived with severe disease or other co-morbidities (all descriptors of typical female CR patients) (Jackson et al., 2005).

A recent study conducted in Australia that involved 196 female cardiac patients reports that the strongest predictor of CR attendance was a diagnosis of CABG (versus MI), and the strongest predictors of non-attendance included the presence of a personal stressful event during follow-up, being unemployed or retired (Gallagher et al., 2003). In this study, women over the age of 70 and under the age of 55 years were least likely to attend, compared to women between the ages of 55 and 70 years, confirming a consistent finding in the literature that age is a predictor of CR attendance (Ades, Waldmann, Polk, et al., 1992; Daly et al., 2002; Evenson, Rosamond, & Luepker, 1998). Ease of physical access and transportation to CR programs was reported as a positive predictor of CR attendance (Gallagher et al., 2003), reflecting previous findings in the literature (Halm et al., 1999; Jackson et al., 2005). The presence of comorbid conditions causing women to report being too sick or tired to participate (Gallagher et al., 2003) also confirms previous findings (Jackson et al., 2005). Interestingly, Gallagher et al. (2003) noted that despite programs having minimal or no cost in Australia, drop-out rates were high among women and similar to those reported by American

studies that cite lack of insurance as a predictor of non-attendance (Daly et al., 2002; Halm et al., 1999; Jackson et al., 2005).

Though it has been reported previously that patients who are married are more likely to participate in CR exercise programs (Hiatt, Hoenshell-Nielson, & Zimmerman, 1990), recent studies involving female patients suggest that being married may decrease women's participation in CR (Husak et al., 2004; Jackson et al., 2005). The role of spousal support has been discussed as a possible predictor of CR participation, as patients lacking adequate social support have been reported to be less likely to participate in CR (Daly et al., 2002). However, Husak et al. (2004) suggest that correlates of social support such as gender, socioeconomic status and comorbidity burden may play a greater role in determining CR participation than social support itself.

Though few studies on CR participation discuss ethnic origin of participants, this issue requires greater consideration when developing and implementing CR programs for women (Jolliffe et al., 2000). Alluded to by Fleury et al. (2004), African American women dealing with competing family priorities report significant barriers to CR exercise participation, a finding supported in the literature on physical activity among minority women (Kriska & Rexroad, 1998). Culturally relevant programs need to be developed to encompass the diversity of meanings of and preferences for 'exercise', 'leisure time', 'sport' and 'physical activity' (Tortolero, Masse, Fulton, Torres, & Kohl, 1999).

Conceptual Framework

Society prescribes different roles in different contexts to women and men. As such, there are differences between men and women in opportunities and resources available to make decisions, including those related to health (World Health Organization, 2002). These gendered roles and life courses create inequitable patterns of exposure to health risks, differential access to and utilization of health information, care and services resulting from unequal social and economic variables (World Health Organization, 2002).

The social ecological approach in health promotion provides an appropriate framework to consider women's barriers to CR as it considers multiple layers of influence on health and health-related behaviours (Breslow, 1996; Green, Richard, & Potvin, 1996; McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis & Owen, 2002; Stokols, 1992). Social ecological models are unique in that they take into account the physical environment and its influence on people at several levels: intrapersonal, interpersonal, organizational, community and public policy (McLeroy et al., 1988; Richard, Potvin, Kishchuk, Prlic, & Green, 1996). Situating the Women's

Cardiovascular Health Initiative (WCHI) within the social ecological model, the program staff operates at the intrapersonal and interpersonal levels to enhance client health. The WCHI also facilitates liaisons between participants and organizations at the greater community level. Beyond the WCHI, Women's College Hospital of Sunnybrook & Women's, acts at community and policy levels to advocate the need for an institution that addresses women's health by providing programs and services for women, such as the WCHI.

The philosophy of health care for women has evolved from a reproduction-centred medical model to a broader biopsychosocial model of women's health in which women's health is described in terms of the entirety of their experiences across the life span, including their roles and the influence of socioeconomic and cultural factors (Health Canada, 2002). This view goes beyond recognizing biological differences to consider gender-based social and economic inequities that affect health (Health Canada, 2002; Strobino, Grason, & Minkovitz, 2002; World Health Organization, 2002), and relates well with a social ecological approach to providing women's health. Recognizing this, a group of health care professionals within Women's College Hospital worked collectively to identify key concepts in women's health in the 1980s. Over the course of one year, these concepts were thematically organized into the Principles of Women's Health (PWH) (see Table 1, page 36). These principles were validated by staff at Women's College Hospital and are consistent with those described in the literature (Schaps, Linn, Wilbanks, & Wilbanks, 1993; van den Brink-Muinen, 1998). These principles seem to remain relevant as a recent unpublished study has suggested that they have resonance among a group of female users of the health care system and a group of experts in women's health (Tassone, McPherson, & Fancott, 2004). With these principles now articulated, programs for women at Women's College Hospital have been re-evaluated and developed. Women's College Hospital recognizes women's special needs, and attempts to affect change within multiple levels of influence within health care (i.e. at the organizational, community and public policy levels), as evidenced by its history of women in medicine. This may facilitate greater access to health care services and positive outcomes for women.

Case Study: Women's Cardiovascular Health Initiative

Women's College Hospital is a unique Canadian institution that has witnessed the evolution of women's health care and is one of Canada's foremost teaching hospitals specializing in women's health. Women's College Hospital was founded in the late 19th century during an era when a woman's place was in the home

with exclusion from professions and positions of power that were the privileged domain of men (Kendrick & Slade, 1993). Many women felt that male physicians were less likely to listen to their health concerns because of their relative inferior and subordinate position as women at that time. Women felt social pressure to hide their 'ailments', including puberty, menstruation, pregnancy and menopause, from public sight. These 'women's problems' were considered a source of weakness and resulted from their 'lack of control' over their bodies (Kendrick & Slade, 1993). Women wanted care from female physicians. However, medical schools in Ontario at that time did not allow women to enrol (Mitchinson, 1998). Women's College Hospital was opened in 1883 to provide women with a place to study medicine and to provide female patients with access to affordable health care, which served their health-related interests. This became an institution that attracted the best female physicians who championed and voiced the early ideals and goals of equality. Through the years, Women's College Hospital has continued its tradition of serving women and has come to be known as a leader in women's health and in the education of women in the health care professions (Kendrick & Slade, 1993).

In response to more contemporary issues in women's health care, the Women's Cardiovascular Health Initiative (WCHI) was developed, opening its doors to women in 1996. The WCHI is a unique comprehensive CR program for women only, developed to assist women with the integration of necessary lifestyle changes into their daily routine. During the development phase of the program, individual interviews and focus groups were conducted with approximately 100 female patients. The overwhelming response was that women wanted to meet other women with CVD, and were looking for support, education and safety. These findings, hospital stakeholder input and expert opinion from CR professionals in Toronto were then used to develop the content of a CR program for women that was guided by the PWH. Our facility, the Canada Trust Cardiac Rehabilitation Centre, currently aims to address the needs of a diverse socioeconomic, ethnic and cultural community of women by providing an inclusive, safe, non-competitive environment.

Two different outpatient programs, CR and primary prevention (PP), are currently offered and are based on the input of women involved in the development phase. The PP program is designed to reduce patient cardiac risk factors and includes a three-month exercise program, while the CR program aims to increase the functional capacity of women with a cardiac diagnosis and includes a six-month exercise program. Both programs include group education classes and individual counseling to provide patients with CVD education, individualized exercise prescription and

training, psychosocial support and links to community resources. The PWH are integral to the delivery of these services.

Application of the Principles of Women's Health

Empowerment

Empowerment involves the disruption of an inherent power structure such that less advantaged groups or individuals (including women) mobilize power to their advantage (Currie & Wiesenber, 2003; Raeburn & Rootman, 1998). Empowerment is a tenet intrinsic to the goals of the women's health movement (Stein, 1997). Empowerment of women involves informed participative decision-making, community input and includes continuous quality improvement based on input from its users (Lippman, 1998). Relationships, respectful partnerships and women's sense of program ownership are essential to women's health and wellness (Raeburn & Rootman, 1998). Theories of women's empowerment are often not put into practice, particularly within a health care system that has originated from a male, biomedical model. Unfortunately, many women remain reluctant to make their own decisions, and feelings of powerlessness have led many women to be dependent on their male physicians, partners and/or parents to make decisions affecting their own health (Currie & Wiesenber, 2003).

The acquisition of independence and autonomy is fundamental to women's empowerment if women are to take control of their health and be active decision-makers directing the course of their health care. Cooperation and interdependence between health care providers and women is required in order to increase women's knowledge, initiate action and to effect necessary improvements in women's health. Women's empowerment in health necessarily involves the validation and valuing of women's experiences. In this way, information about women's experiences is actively sought with the perspective that each woman is an expert on her mental and physical experiences, and that she best appreciates her self-identified needs. Health professionals can contribute to women's empowerment by facilitating instead of directing women's decision-making.

Given this perspective, it must be considered that women accessing health care providers are seeking the information and knowledge required by them to make informed choices relevant to their capacity to engage in practices to improve their own health (Currie & Wiesenber, 2003). Health professionals can enable women to control and improve their health by helping women to explore and identify their personal preferences, motivations, competencies and skills with

which they can address their personal lifestyles and situation. Furthermore, professionals play a role in collaborating with women to identify, articulate and address the barriers they face in constructing healthful lives. Empowerment of women can thus only be achieved if the traditional hierarchical structure of the

Table 1

The Definition and Principles of Women's Health

Sunnybrook & Women's Definition of Women's Health:

Women's health involves women's emotional, social, cultural, spiritual and physical well-being and is determined by the social, political and economic context of women's lives, as well as by biology. This broad definition recognizes the validity of women's life experiences, and women's own beliefs about, and experiences of, health. Every woman should be provided with the opportunity to sustain and maintain health as defined by that woman herself to her full potential.

Approved by Sunnybrook & Women's Board, June 25, 2001

Source: Originated by the McMaster University Women's Health Office. Adopted by Health Canada and by the Gender Issues Committee of the Council of Ontario Faculties of Medicine.

We are leaders in the provision of care based on the Principles of Women's Health, which are:

- **Empowerment of Women** through informed, participative decision-making, community input and consumer evaluation of programs.
- **Accessible Programs** through flexible schedules, physical accessibility, sensitivity to cultural and linguistic issues and self-referral to programs as appropriate.
- **Broad Definition of Health Care** including disease prevention and health promotion programs, flexible models of care and the provision of care appropriate to different stages in a woman's life cycle.
- **High Quality of Care** that is protected and safe, compassionate, empathetic and that respects the choices individuals make based on their own unique experiences and perceptions.
- **Collaborative Planning** demonstrated by provision of health care by an interdisciplinary team in conjunction with community partnership.
- **Innovative and Creative Approaches** to women's biological and gender needs and wants, health research issues and in response to contemporary health issues.

health care sector is transparent and open to change. While we recognize that institutions/programs hold the balance of power, it is used positively to advocate for our individual clients and groups (Raeburn & Rootman, 1998). For example, the nurse practitioner at WCHI assists patients to obtain referrals by advocating for them, by communicating directly with their GPs regarding health concerns, as well as obtaining referrals to high-demand health care programs and services beyond CR.

The existence of WCHI is in itself an example of empowerment of women as it provides a service for women living with or at risk for CVD. Women are provided with relevant information about health services that they can access in both the public and private sector. The health care team at WCHI encourages women to identify and strengthen personal resources to address individual health problems. By increasing women's sense of control over their own health, health is improved within a collaborative relationship between the women and their health professionals (Raeburn & Rootman, 1998). Empowerment of women is operationalized in many ways. At WCHI, the health care team regularly engages in acts of listening and formation of true partnerships with women, acknowledging women's diverse roles, responsibilities and experiences and providing personalized goal setting. Client-driven decision-making is considered key to avoid imposing personal or professional agendas and values on women.

The physical space of the WCHI provides an environment of warmth, empathy, caring and is a safe place for women to communicate openly about their needs and issues. The space of the WCHI is women-centred, with friendly colours and décor. Early program participants contributed to the development of this space by voicing their preferences for equipment and layout. Change rooms, shower facilities, towels, day lockers and an outdoor coat closet are available. The walls display the pictures of past participants, relevant literature and motivating captions. Patients and staff have contributed to the décor by donating pictures, wall hangings and floral arrangements. The WCHI solicits yearly feedback from clients (formally and informally) and evaluates client satisfaction. The health care team applies this input to the program to modify and/or to develop further program components and workshops. Specific educational programs and materials on women's health issues are offered based on requests of consumers. Clients and health care providers at the WCHI are also engaged in annual community events promoting women and heart health, providing advocacy at the individual and team level. Having the institution acknowledge the power differential is the first step to empowering women.

Broad Definition of Health

As stated earlier, the philosophy of health care for women has evolved from a reproduction-centred medical model to a broader biopsychosocial model of women's health. This broad definition of health care includes disease prevention and health promotion programs, flexible models of care and the provision of care appropriate to different stages in a woman's life cycle. There is a focus on independence and wellness as defined by women, with recognition that health is more than the absence of disease or disability, but is rather the maintenance of psychosocial well-being in addition to physical health. Traditional and complementary practices are also supported through innovative, flexible approaches to care.

The WCHI offers both PP and CR programs, so that any woman can access the program regardless of experiencing a cardiac event. Within the CR stream, all cardiac diagnoses are eligible for participation and are not limited to acute events. Within both the CR and PP programs, the focus is not only on CV health, but includes other health concerns, such as breast health, osteoporosis, incontinence and body image. Lifestyle changes are encouraged within the context of each woman's life experiences, though there is an appreciation that there may be an interaction among many of the determinants of health, with social processes either aggravating or improving health impacts. The highly interactive nature of the determinants of women's health may be illustrated by an example. Stress has adverse physical outcomes for both men and women but, in many cases, may have particular origins in women's social-structural roles. Stress can be occasioned both by the financial pressures of pay inequity and single parenthood, and by the double burden of paid and unpaid work, which, in turn, may lead to time stress and unhealthy lifestyle behaviours. In this case, a wide range of health determinants, including employment, income, gender, lifestyle, marital status and stress may interact to produce physical health problems. This indicates clearly that these indicators should not be seen in isolation, but as highly dynamic and interactive (Health Canada, 2003).

Accessibility

Accessibility of programs, through flexible schedules, sensitivity to cultural and language issues and self-referral to programs as appropriate, is an essential principle of women's health. Accessibility is operationalized at the WCHI by being conveniently located downtown and accessible by public transportation, offering clients flexible hours and schedules (i.e. morning, afternoon and evening classes) and short wait times for initial assessment and enrolment. Subsidies for program cost are provided for low-income clients so that no one is denied

participation or care because of financial constraints. Interpreters are also available for participants who do not speak or understand English. The core education workshops are offered during each separate class time in order to allow women to attend without having to disrupt schedules, and special topics are offered on alternative days and times over the course of a year.

High Quality Care

Canadian women have questioned some of the fundamental approaches to how health care services are delivered and many professionally accepted assumptions of 'high quality care' (Tudiver & Hall, 1996). High quality of care refers to care that is compassionate, empathetic and that acknowledges the choices individuals make based on their own unique experiences and perceptions. However, women routinely identify: differentials of power and authority between the roles of doctor (both male and female) and patient, feeling intimidated to question professional expertise or refuse treatment; sexist and paternalistic attitudes and behaviours that may influence interactions with male doctors and may affect treatments (such as referral for cardiac diagnostic testing or rehabilitation); severe time constraints on most medical encounters which limit communication between patient and caregiver; lack of sufficient information and access to resources to make informed decisions about proposed treatments and; fragmented care, so that a patient feels she is no more than the sum of her body parts (Currie & Wiesenberg, 2003; Health Canada, 2002; Tassone et al., 2004; Tudiver & Hall, 1996).

At the WCHI, clinical services and facilities are designed to be women-centred and care is evidence-based. In practice, this care includes an hour-long intake assessment with the nurse practitioner (NP), a full medical history, physical and medical examination, an exercise treadmill test and personalized orientation once enrolled in one of the WCHI programs. A cardiologist reviews the case with the NP and acts as a consultant for the program. Staff are accessible by phone or e-mail and clients are encouraged to contact anyone on the team during their participation in the program if any questions or concerns arise. Links with other services are made for clients as appropriate when the intake assessment has been completed. Once a participant completes the program, staff continue to be accessible as a health resource via telephone, e-mail or in-person interactions.

Exercise classes are informal and highly interactive within a small group setting (eight to nine women). This high participant to exercise staff ratio (4:1) is maintained in order to optimize opportunities for social and supportive interaction during the class sessions, an element of programming that is often

taken for granted but, for women, is the most valued (Lenskyj, 2003). The comprehensive exercise program is designed to provide personal, supervised treatment within a non-competitive atmosphere. Aerobic activity, the primary focus of the program, is performed in short bouts with frequent, short rest breaks between exercises (circuit training). Strength training is introduced to participants using body-weight, free weights, Therabands', tubing and stability balls. Significant attention is paid to exercise safety and movement skills such as flexibility, coordination, posture, core stability and balance, as these skills are relevant to many women who may be post-menopausal, at risk for or living with osteoporosis and for whom falling can be life-threatening if they often live or travel alone (Stevens & Olson, 2000). In addition, the majority of the CR participants are older with co-morbidities that require them to exercise at low to moderate intensity with an emphasis on strength training, a factor that may play a large role in women maintaining their independent living (Arthur, H. personal communication, 2005; Pollock et al., 2000). Methods of stress reduction are also practised and include progressive muscular relaxation, deep breathing and meditation.

Collaborative Planning

The principle of collaborative planning is demonstrated by the provision of health care by an interdisciplinary team in conjunction with community partnership with the participant as an active member of the team. The WCHI team comprises cardiologists, a nurse practitioner, physiotherapists, exercise specialists, a respiratory therapist, registered dietitian, social worker and the participant. This team collaborates with a commitment to the philosophy of women-centred care, guided by client-identified goals. Collaboration is initiated at the intake appointment with the participant as they are asked for their expectations of the program and their health-related goals. Staff communicate with each other in either a formal client case meeting or on an individual referral basis with a women-centred framework at its core. Participants are linked and referred to internal and external programs within the larger health care system. These programs and services include smoking cessation, healthy weight management, nutrition and social work counselling, cognitive behaviour therapy, mental health and diabetes education programs. Throughout a client's participation in the WCHI, these programs are recommended and discussed as appropriate. Women may request a referral (or self-refer if available) to these programs at any time during or after their participation. All client updates and information pertaining to test results and progress are communicated to their referring physicians upon

intake, at mid-term, discharge and follow-up assessments. Participants are also connected within the community to continue their health and fitness goals. This is an active process starting at entry to the program and allows each client to actively engage in the process of finding programs and services in the community to assist her in maintaining a heart healthy lifestyle. Community links may be culturally and language specific and may include walking and exercise programs, community centres, women's-only facilities, social services and support groups.

Despite best attempts to accommodate every woman interested in our program, there are some women who are not able to attend. Commuting, transportation and/or mobility issues may prevent the participation of some potential participants. In these cases, services such as a one-time exercise consultation, home program, referral to a closer or language-sensitive CR program, day hospital or referral to further investigate pressing health issues are provided with the collaboration of the team and in conjunction with community partnership to impart delivery of care that best meets clients' needs.

Innovative and Creative Approaches

The final principle of women's health is to be innovative and have creative approaches to current women's health and research issues. For example, by embracing a broader definition of health and using the concept of empowerment, one can facilitate innovative and creative approaches to developing and implementing services and research that considers gender issues. Using unique models of care for disease prevention and health promotion, appropriate to different stages in a woman's life and her experiences, can also lead to alternative methods of providing quality health care. The WCHI exemplifies this principle. A gender lens is applied to all research in which the WCHI is engaged. The WCHI incorporates into its practice the findings of current scientific literature on women and CVD, thereby offering evidence-based care. This is established by providing care under current guidelines for CR and CVD prevention and risk factor identification and management. Evidence specific to cardiac care for women is sought out and used when available. Innovative and creative strategies provide risk factor and lifestyle modification through women-focused content and delivery.

We also re-evaluate and examine current elements using client feedback and respond to contemporary

health issues. Issues are addressed with participants during group education sessions, workshops and with individual counselling. The WCHI's women-focused resource room provides books, videos, pamphlets and brochures of interest to our clients. Classes that involve holistic and alternative healing practices, such as relaxation, yoga and a meditative labyrinth have been offered in response to client requests. Health information and research is accessible to participants in the program through annual alumnae events, newsletters, book reviews and workshops. One example of this is an annual event hosted by the WCHI called "Women's Day Apart", a one-day event developed to reunite past and current participants and to present health issues and information in a more social gathering.

Discussion

Consideration of gender-specific variables when designing and implementing CR and PP programs at the WCHI has led to significant improvements in women's exercise capacity and quality of life. Though the WCHI sees fewer clients per year than average CR programs, outcome measures and compliance rates are noteworthy. From November 1, 1996 to May 31, 2004, 315 clients entered WCHI's CR and 317 entered the PP program. The compliance rate to completion for both groups was 85%, much higher than previously reported (Boogaard, 1984; Oldridge, 1988). These statistics are encouraging for the development of programs similar to the WCHI, but issues of program accessibility remain a concern. The WCHI is still limited in its ability to reach and treat women who are visible minorities, who do not speak English fluently, who are unemployed and who have not completed high school education. Addressing these disparities is the focus of future WCHI initiatives to improve CR and PP program recruitment, delivery and effectiveness.

Ethnicity and Language

Located in the ethnically diverse city of Toronto*, the WCHI program staff is necessarily sensitive to cultural differences, willing to accommodate clients who are not fluent in English and able to refer clients to appropriate cultural community health care services. However, all services and written materials are in the English language, a possible barrier for some participants. Some community outreach projects with Toronto's South Asian community have been initiated by program staff and have resulted in the acquisition of heart health education booklets written in Urdu. More initiatives of this nature are needed in order to

* Nearly 50% of all Toronto residents have immigrated to Canada from another country and nearly 47% of all residents speak a language other than English or French (Statistics Canada, 2001).

adequately serve Toronto's diverse population of women seeking heart health programs (Alter, Iron, Austin, & Naylor, 2004; Krummel et al., 2001). At present, WCHI does not request or collect information pertaining to clients' race or ethnic origin. Recent literature suggests, however, that this research is necessary in order to direct the design and testing of interventions that aim to eliminate health disparities (Allen & Szanton, 2005; Alter et al., 2004; Krummel et al., 2001). The WCHI plans to soon conduct a review of the research on ethnicity, gender and CR attendance to guide future research projects.

Education and Employment

Sociodemographic information on participants enrolled in either the CR or PP program prior to 2001 is limited. Clients enrolled in the program since 2001, however, have been included in the program's database and this serves as a key tool for research on the program and its participants. A large body of literature has shown that patients with more education (particularly those having completed high school or post-secondary education) and who are employed have greater rates of referral and attendance in CR programs despite similar rates of general practitioner follow-up (Alter et al., 2004; Evenson et al., 1998; Harlan, Sandler, Lee, Lam, & Mark, 1995; Lane, Carroll, Ring, Beevers, & Lip, 2001; Ramm, Robinson, & Sharpe, 2001), even when financial waivers are offered to clients (Harlan et al., 1995). This disparity has been suggested to be due to clients with greater income perceiving more benefits and fewer barriers to CR (Hiatt, Hoenshell-Nelson, & Zimmerman, 1990), and the role of employment in providing women with financial, self-esteem and support resources to support CR attendance (Gallagher et al., 2003). Though the WCHI does not collect information on participants' income, a preliminary analysis of self-reported education and employment information provides a rough profile of the socioeconomic status of the patients enrolled in WCHI programs (see Figures 1 and 2).

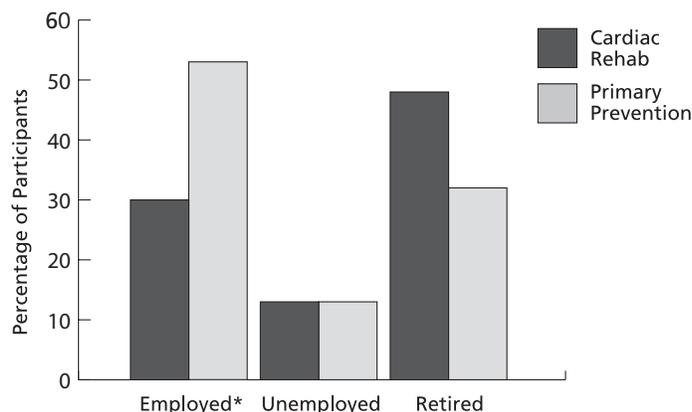
Evenson et al. (1998) suggest that greater program promotion and referral to CR is needed for unemployed persons and those with less education, particularly because these people may experience more serious cardiac events and have a greater need for CR (Alter et al., 2004). Our data reflect current statistics on CR attendance, but further analyses are needed to determine whether patterns of CR attendance among our population are similar to the results of previous studies that suggest that living with a partner improves CR attendance and that being the main care-giver for a significant other decreases women's probability of

attending CR (Lane et al., 2001). Further research is also needed to assess how cardiac diagnosis, procedure and/or the existence of comorbid conditions affects participation in our CR and PP programs as the literature has previously demonstrated correlations between these variables and CR attendance, but has done so with study populations that include significantly more male than female clients (Alter et al., 2004; Evenson et al., 1998; Lane et al., 2001).

Conclusion

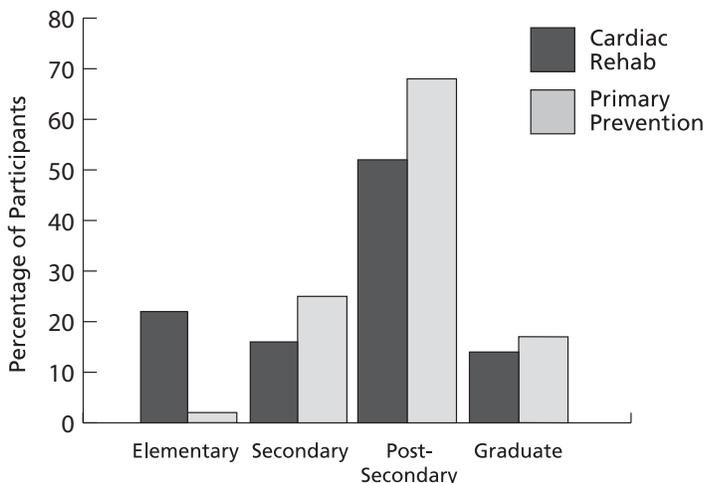
The PWH reflect women's values in health care practice. The WCHI has embraced these principles in order to provide a unique service that is sensitive to women's needs. As a result, the program is able to

Figure 1
Employment status of cardiac rehab and primary prevention patients



*Employed = Inside or outside the home, part-time or full-time

Figure 2
Highest level of education achieved among cardiac rehab and primary prevention program participants



accommodate women facing typical barriers to CR and exercise (i.e. referral bias, busy schedules, care-taking responsibilities) (Heid & Schmelzer, 2004; Ramm et al., 2001). Consideration of these principles should be incorporated into the development of similar CR and PP programs. There may be a greater benefit to women involved in a women-only CR program where disparities in women's health and access to CR may be identified and eliminated. It is the success of programs like the WCHI that will serve to encourage other health care providers to take the lead in forging the gap between women's health and CR care. The social ecological model can be used to gain a more comprehensive understanding of the complexity and various environmental influences impacting women's health, providing a foundation for the effective delivery of health care programs and services. Though Sunnybrook & Women's College Health Sciences Centre continues to advocate for change, equality and recognition of women's special needs, further initiatives are needed to improve women's access to CR services at a community and public policy level. ♥

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Maternal Cardiac Autonomic Function and Fetal Heart Rate in Preeclamptic Compared to Normotensive Pregnancies

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Background: Preeclampsia during pregnancy increases a woman's risk of cardiovascular disease in two ways. Women who develop preeclampsia are at increased risk for the development of hypertension and cardiovascular disease later in life. As well, fetal adaptations (e.g., growth restriction) may lead to the development of cardiovascular risk factors (e.g., obesity, increased cholesterol) in the offspring. Although atypical maternal cardiac autonomic function has been reported in preeclampsia, to date, its effects on fetal cardiac function have not been determined.

Purpose: To characterize the pattern of short-term maternal cardiac autonomic modulation and spontaneous fetal heart rate changes in preeclamptic compared to normotensive women and to determine the relationship between them.

Method: Twenty-seven mother-fetal pairs (n = 9 preeclamptic, n = 18 normotensive) at 32 to 40 weeks gestation were tested on one occasion. Maternal autonomic modulation of heart rate was measured for 20 minutes using electrocardiographic and beat-by-beat arterial systolic blood pressure recordings. Simultaneously, spontaneous fetal heart rate was obtained using a cardi tachograph. Women's cardiac autonomic responses to orthostatic stress were obtained for five minutes in a standing position.

Results: Comparisons of maternal cardiac measures in the preeclamptic versus the normotensive group showed that the preeclamptic group had a decreased

parasympathetic nervous system indicator and an increased sympathetic nervous system indicator with increasing gestation. In response to orthostatic stress, women in both groups showed a similar increase in arterial systolic blood pressure and a decrease in parasympathetic nervous system indicator and R-R interval when standing compared to lying. Fetuses in the normotensive compared to the preeclamptic group had more spontaneous fetal heart rate accelerations; the greater the decrease in the parasympathetic nervous system indicator from lying to standing, the greater the number of fetal heart rate accelerations.

Conclusions: These findings serve to further our understanding of the cardiovascular pathophysiology of preeclampsia in both the mother and the fetus. Women who develop preeclampsia during pregnancy show atypical autonomic nervous system modulation of heart rate that is associated with a decrease in spontaneous fetal heart rate accelerations in late gestation. Implications for cardiovascular nursing practice include the monitoring of maternal cardiac autonomic function during pregnancy, especially during standing, as well as a need for continued surveillance of maternal cardiovascular function following pregnancy. The negative effect on fetal heart rate accelerations has implications for the interpretation of standardized obstetrical tests of fetal well-being.

Key words: pregnancy, heart rate variability, fetal heart rate, preeclampsia

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Cardiovascular disease is a leading cause of mortality and morbidity in Canadian women (Heart and Stroke Foundation of Canada, 2003). Preeclampsia during pregnancy is a particularly important contributor to the problem for two reasons: it may compromise short-term maternal cardiovascular responses to physical stressors, such as standing, and it is associated with not only

the long-term maternal risk of developing cardiovascular disease, but also the fetal adaptation leading to the development of cardiovascular risk factors in the offspring. For women diagnosed with preeclampsia during pregnancy, the risk of developing hypertension within 13 years is as high as 38%, the rate increasing with longer follow-up (Marin et al.,

2000; Nisell, Lintu, Lunell, Mollerstrom, & Pettersson, 1995). The offspring are at risk for growth restriction as a result of inadequate placental function with impaired nutrient transfer. Decreases in fetal growth, while adaptive in utero to reduce the need for substrates, may result in permanent metabolic and physiologic changes (e.g., heart, blood vessels, kidneys) (Barker, Eriksson, Forsen, & Osmond, 2002). Such changes are maladaptive in the long term, resulting in increased circulating cholesterol, hypertension and left ventricular hypertrophy culminating in an increased risk for the development of cardiovascular disease (Barker, Osmond, Winter, Margetts, & Simmonds, 1989). Clearly, preeclampsia is an important issue for women's cardiovascular health in general and cardiovascular nursing in particular. A better understanding of the cardiovascular changes occurring in the woman with preeclampsia and the effect of these changes on the cardiovascular system of the fetus may eventually allow us to provide more specific, evidence-based care prior to as well as during pregnancy and more appropriate follow-up care after pregnancy to these women and their children.

Preeclampsia is a multisystem disorder in pregnancy diagnosed by the presence of increased blood pressure (>140/90 mmHg) and proteinuria (>0.3g/d) (Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy, 2000). It is important because it is a leading cause of both maternal (e.g., hypertension, proteinuria, elevated liver enzymes) and fetal (e.g., abruption, growth restriction, prematurity) morbidity and mortality, affecting five to 10% of pregnancies (Roberts & Lain, 2002). While the exact etiology of preeclampsia is unknown, it is thought to be due to abnormal placentation resulting in production of factor(s) that, when released into the maternal circulation, result in the clinical syndrome. As a result of maternal vascular/endothelial/organ damage, there also are changes in the maternal autonomic nervous system. Atypical maternal cardiovascular responses (e.g., Molino, et al., 1999) as well as maternal autonomic nervous system dysfunction, such as increased sympathetic and decreased parasympathetic cardiac modulation combined with enhanced vasomotor sympathetic modulation, have been reported (Pagani & Lucini, 2001; American College of Obstetricians and Gynecologists Technical Bulletin, 2002). To date, however, such studies have not examined atypical maternal cardiac function and fetal cardiac function simultaneously. Thus, the focus of this study was to compare

patterns of maternal autonomic nervous system responses in supine and standing postures and spontaneous fetal heart rate changes. As well, we examined the relation between the two in preeclamptic and normotensive pregnancies to further our understanding of the pathophysiology of preeclampsia and its effect on the cardiovascular system of mother and fetus.

Clinically, heart rate and blood pressure are measured routinely to assess the cardiovascular well-being of the mother. However, measures of the dynamics of heart rate variability and spontaneous baroreflex sensitivity give more information than these routine measures. The short-term regulation of heart rate and blood pressure is controlled primarily by the autonomic nervous system and the arterial baroreflex (Berne & Levy, 2001). Spontaneous variability in heart rate occurs on a beat-by-beat basis in healthy individuals. This variability, which is mediated by the parasympathetic division of the autonomic nervous system via the vagus nerve to the sinoatrial (SA) node, is an important mechanism for adaptability and flexibility in cardiovascular responses to unpredictable and varying internal and external stimuli (Akselrod, et al., 1981; Hainsworth, 1996). Heart rate is also influenced by the arterial baroreflex, which is a negative feedback system that maintains arterial blood pressure within a normal range for any given individual. The arterial baroreflex reflects the sensitivity of the baroreceptors in the aortic arch and carotid sinus to detect and respond to acute changes in arterial pressure, central integration and processing of afferent neural inputs from the baroreceptors, and the competing influences of the two efferent divisions of the autonomic nervous system on the heart and blood vessels (Dampney, 1994; Smit, Weiling, & Karemaker, 1996). This paper focuses on the function of the cardiac arm of the arterial baroreflex, the beat-by-beat change in heart rate (i.e., heart rate variability) as a consequence of a change in arterial blood pressure. The slope of the R-R interval response to a change in systolic blood pressure (baroreflex slope) is used as a measure of baroreflex sensitivity. Heart rate variability is the beat-by-beat fluctuation in consecutive R-R intervals (in milliseconds) of the electrical activity of the heart. To obtain measures of the sympathetic and parasympathetic influence on heart rate, the continuous electrocardiogram (ECG) signals are fed into a computer that records the R-R intervals over time.

Cardiovascular reflex tests, in which blood pressure and heart rate responses to a physiological stressor (i.e., the standing posture) are observed, are useful in examining the function of the autonomic nervous

system. The initial response to the standing posture is venous pooling in the legs, resulting in decreased return to the heart. Decreased venous return, or decreased preload, leads to reduced cardiac output and arterial blood pressure. To counteract the acute reduction in arterial blood pressure, heart rate, cardiac contractility and vascular tone increase (Hainsworth, 1996). The change in heart rate occurs because of a decrease in parasympathetic output, and a concurrent increase in sympathetic output, to the SA node (Blaber, Yamamoto, & Hughson, 1995; Hainsworth, 1996). The change in blood pressure is due to an increase in sympathetic output to, and vasoconstriction of the resistance and capacitance vessels (Hainsworth, 1996; Kamath, Fallen, & McKelvie, 1991). Consequently, there is an increase in heart rate, myocardial contractility and vascular tone (venoconstriction and vasoconstriction) that combine to reverse the initial decrease in venous return, cardiac output and blood pressure.

In normotensive pregnancies, findings from studies using measures of short-term autonomic modulation of heart rate and arterial blood pressure responses to position change indicate that reductions of parasympathetic activity and increases of sympathetic activity are blunted (Avery, Wolfe, Amara, Davies, & McGrath, 2001; Ekholm, Piha, Antila, & Erkkola, 1993). In pregnancies complicated by hypertension, autonomic responses are further attenuated (Airaksinen et al., 1996). However, in preeclamptic pregnancies, there are conflicting results from studies of cardiac autonomic control. Comparing autonomic cardiovascular control in normal and preeclamptic pregnancies, some researchers (e.g., Eneroth-Grimfors, Westgren, Ericson, Ihrman-Sandahl, & Lindblad, 1994) have shown preeclampsia to be associated with decreased parasympathetic control with no significant sympathetic impairment. A reduction in parasympathetic modulation of heart rate decreases the ability of the cardiovascular system to adapt rapidly to changing internal and external stimuli. This loss of adaptation may have implications for maternal as well as fetal cardiovascular responses and may compromise fetal well-being. Conversely, others (e.g., Rang, Wolf, Montfrans, & Karemaker, 2004; Schobel, Fischer, Heuszer, Geiger, & Schmieder, 1996) report that higher sympathetic nervous system activity is the predominant autonomic nervous system disturbance. Clearly, whether the parasympathetic or the sympathetic nervous system is affected or under what conditions one or the other is compromised is yet to be determined.

There is a similar conflict in the literature relating to autonomic baroreflex control in preeclampsia. Some investigators (Leduc, Wasserstrum, Spillman, & Cotton, 1991; Silver, Tahvanainen, Kuusela, Eckberg, 2001) report a decline in baroreflex sensitivity in preeclampsia and suggest that this decline may be indicative of the withdrawal of parasympathetic innervation. Others (Faber et al., 2004) have reported unaltered baroreflex sensitivity. Given the critical role of the autonomic nervous system and baroreflex sensitivity in the modulation of heart rate and blood pressure and evidence of a blunting of both parasympathetic and sympathetic activity in normotensive pregnancies, it is important to characterize additional cardiovascular impairments imposed in the presence of preeclampsia to ensure maternal cardiovascular competence and adequate fetal oxygen/nutrient supply.

In studying cardiovascular issues in both pregnant women and their fetuses, it should be noted that, while measures of spontaneous maternal heart rate changes employ sophisticated technologies using an electrocardiogram, measures of fetal cardiac activity are crude by comparison. Because of the difficulties inherent in reliably separating the maternal and fetal electrocardiogram, commercial fetal cardiocographs measure muscular contraction of the fetal heart. A standardized non-stress test has been developed employing observations of spontaneous fetal cardiac changes to assess fetal well-being. In North America, it has become the most common standardized test of fetal well-being in obstetrical clinical practice. The test includes a continuous, 20-minute recording of spontaneous fetal heart rate while the mother is at rest. A reactive non-stress test, which suggests well-being, includes at least two accelerations of 15 bpm lasting 15 seconds (Davies, 2000).

Few studies have examined the relation between maternal hypertension during pregnancy and spontaneous fetal heart rate activity. A negative relation between maternal blood pressure and amount of fetal activity has been demonstrated (Montan & Ingemarsson, 1989; Warner, Hains, & Kisilevsky, 2002). Warner et al. found that maternal systolic BP was negatively related to the number of spontaneous body movements observed on ultrasound scan over 20 minutes and the magnitude of the fetal heart rate acceleration elicited by a vibroacoustic stimulus.

The above studies relied simply on characterizing the mothers as normotensive or hypertensive; they did not examine the maternal autonomic cardiovascular control. A recent study (Brown, Lee, Hains, & Kisilevsky, 2005) reported on the maternal

sympathetic and parasympathetic heart rate control systems and related these measures to fetal heart rate changes during the non-stress test. A correlation between gestational age and autonomic control in the hypertensive, but not in the normotensive group, was found. Also, there appeared to be a correlation between measures of the maternal autonomic cardiovascular control and fetal cardiac changes in the non-stress test in the hypertensive group but not in the normotensive group. This would support the notion of a possible relation between the maternal autonomic nervous system and fetal heart rate control. However, this study did not include preeclamptic pregnancies and did not measure maternal autonomic response to stress. The following study was conducted to characterize the pattern of short-term maternal cardiac autonomic modulation and spontaneous fetal cardiac changes in preeclamptic compared to normotensive women and to determine the relationship between them.

Method

Participants

Twenty-seven mother-fetal pairs (n=18 normotensive, n=9 preeclamptic) from 32 to 40 weeks gestational age were tested following voluntary informed, written consent provided by the mothers-to-be. Five additional mother-fetal pairs were tested but excluded from data analyses. Fetal data from three normotensive pregnancies were excluded because of pre- or post-natal complications (premature rupture of membranes, gestational hypertension, Hirschsprung's disease). Maternal data from two participants in the preeclamptic group were excluded because they were unable to complete the procedure in the standing position; one woman in the normotensive group whose fetal data were excluded also failed to complete the procedure in the standing position. Women were at least 16 years of age (M=29.7 years, SD=5.4), had a singleton pregnancy and were receiving antenatal care at a community teaching hospital in southeastern Ontario. Gestational age was calculated from the first day of the last menstrual period and confirmed by early ultrasound scan at eight to 12 weeks' gestation. The study was conducted in accordance with approval from the Queen's University and Affiliated Teaching Hospitals Research Ethics Board.

The preeclamptic group included mother-fetal pairs experiencing a pregnancy complicated by preeclampsia. Diagnosis of preeclampsia was based on the presence of hypertension (> 140/90 mm Hg) accompanied by proteinuria (0.3 g/d) (Report of the

National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy, 2000). The low-risk, comparison group included mother-fetal pairs experiencing an uneventful, normotensive pregnancy. All mothers were non-smoking. One woman in the normotensive group was on medications for asthma (Fluticasone and Terbutaline Sulfate) and gastroesophageal reflux (Ranitidine HCl). One woman in the preeclamptic group was on medications for hypertension (Labetolol HCl and Methyldopa) and one was on medication for gastroesophageal reflux (Ranitidine HCl). These participants and their fetuses showed no significant difference on any measure compared to those who were not on medications.

Equipment

A LifeSource One Step Auto-Inflation Blood Pressure Monitor (Model UA-767) was used to measure baseline maternal blood pressure on the upper left arm in the sitting position. During autonomic testing, a Finapres® 2300 digital automated blood pressure monitor measured the spontaneous beat-by-beat arterial blood pressure by finger photoplethysmography. The reliability of the Finapres® 2300 in detecting changes in beat-to-beat blood pressure has been established in previous investigations (Imholz, et al., 1988; Jagomagi, Raamat, & Talts, 2001).

Maternal heart rate variability data were collected during autonomic testing with a surface electrocardiograph (ECG) (Spacelab 514T cardiac monitor with a QRS detector). The analog R-R interval output from the ECG was digitized using an analog-digital converter (Metrabyte Corp., DAS-16) at a sampling rate of 1000 Hz, providing an R-R interval accuracy of one millisecond (Yamamoto, Hughson, & Peterson, 1991; Parlow, Viale, Annat, Hughson, & Quintin, 1995). The digital R-R output from the cardiac monitor was routed to an IBM-compatible computer. Purpose-written software was used to record, calibrate and edit the digitalized signal for later off-line analysis of beat-to-beat arterial blood pressure (Hughson, Quintin, Annat, Yamamoto, & Gharib, 1993). Fetal heart rate was recorded continuously using a Hewlett-Packard cardiotocograph (Model 1351A).

Procedure

Participants underwent testing at the maternal-fetal laboratory located in the hospital, adjacent to the inpatient and outpatient services. The participants were asked to refrain from smoking, alcohol and caffeine consumption and strenuous physical activity for 24 hours prior to testing.

Baseline maternal blood pressure was taken using a LifeSource blood pressure monitor with the mother in a seated position. The lower edge of the blood pressure cuff was placed approximately 2.5 cm above the site of the brachial artery (determined by palpation of the left arm). Subsequently, maternal heart rate variability (R-R interval data) and maternal beat-by-beat arterial blood pressure (Finapres® 2300) as well as spontaneous fetal heart rate were measured simultaneously and continuously for 20 minutes with the mother in a semi-recumbent left lateral position. Maternal R-R interval data were obtained using an ECG recording, with three latex-free, standard surface ECG electrodes in a Lead II configuration. To measure maternal beat-by-beat arterial blood pressure, a finger cuff was placed on the middle phalanx of the third digit on the left hand and connected to a transducer that was positioned on top of the hand. The left hand was then elevated to the level of the phlebostatic axis of the heart by placing a pillow beneath the left arm. The cardiocograph transducer was placed on the maternal abdomen and spontaneous fetal heart rate activity in beats per minute (bpm) was recorded on a strip recording. Following supine testing, participants stood upright for a five-minute equilibrium period in the free standing posture, followed by five minutes of free standing (Kamath, et al., 1991). The heart rate variability and beat-by-beat arterial blood pressure data collected during the last 10 minutes in the supine position and the last 5 minutes in the free standing position were used for analyses (Hughson, Northey, Xing, Dietrich, & Cochrane, 1991).

Data Reduction

Heart rate variability. Heart rate variability is the beat-by-beat fluctuation in consecutive R-R intervals of the electrical activity of the heart and reflects the competing influences of the parasympathetic and sympathetic nervous systems on the SA node. Power spectral analysis was used to transform the time signal of continuous R-R interval data into frequency components (Brown, Wolfe, Hains, Ropchan, & Parlow, 2003, 2004; Yamamoto & Hughson, 1991). Power spectral analysis provides data on how power (variance) distributes as a function of frequency (heart rate fluctuation) and has been recommended for short-term data recordings (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996). Spectral analysis yields three main frequency power components: very low frequency, low frequency and high frequency. The specific

autonomic activity defined within each of the frequency spectrums has been determined through pharmacological blockade of the individual branches of the autonomic nervous system (Akselrod, et al., 1981). In humans, high frequency power (0.15-0.40 Hz) is correlated with respiratory driven vagal efferent output to the sinus node and represents parasympathetic modulation of heart rate (Akselrod, et al, 1981; Akselrod, Gordon, Madwed, Snidman, Shannon, & Cohen, 1985; Molino, et al., 1999). The low frequency band (0.04-0.15 Hz) reflects both sympathetic nervous system and parasympathetic autonomic influences and includes the baroreflex (0.07-0.14 Hz) (Berger, Saul, & Cohen, 1989; Yang, Chao, Kuo, Yin, & Chen, 2000). Total power is represented by the total area under the power spectral curve. The ratio of high frequency power to total power has been used as an index of cardiac parasympathetic modulation (parasympathetic nervous system indicator); the ratio of low frequency power to high frequency power has been used to reflect cardiac sympathetic modulation (sympathetic nervous system indicator) (Amara & Wolfe, 1998; Cammann, & Michel, 2002).

Spontaneous baroreflex sensitivity. Baroreflex sensitivity is the heart rate variability, or R-R interval, response to a change in arterial blood pressure. In this study, spontaneous baroreflex sensitivity reflected the R-R interval response to a 1 mm Hg change in systolic blood pressure, as measured by the Finapres® 2300 (Brown, et al., 2003). The sequence method of analysis that has been shown to yield similar results to the spectral analysis method was used to calculate spontaneous baroreflex sensitivity (Parlow, et al., 1995). In this technique, baroreflex sequences are identified by a series of three or more cardiac cycles, demonstrating either a lengthening of R-R interval following a rise in arterial systolic blood pressure, or a shortening of R-R intervals following a decrease in systolic blood pressure (Blaber, et al., 1995; Hughson et al., 1993). Sequences of three or more beats in which arterial systolic blood pressure and R-R interval change in the same direction are analyzed using a linear regression analysis. The average slope of the systolic blood pressure-R-R interval relationship is then used as an index of spontaneous baroreflex sensitivity (Blaber, et al.; Hughson, et al.).

Fetal heart rate. The digital record of fetal heart rate was scored visually for the number of accelerations greater than 10 beats per minute (bpm), lasting 10 seconds and greater than 15 bpm, lasting 15 seconds and the number of decelerations > 10 bpm, lasting 10 seconds and greater than 15 bpm, lasting 15 seconds. Records were scored independently by the first author and a

trained research assistant. Given the high reliability between scorers ($r=0.99$), only the scores of the first author were used in data analyses.

	Normotensive (n = 18)	Preeclamptic (n = 9)
Maternal age (years)	29.9 (4.7)	28.3 (6.6)
Gestational age at testing (weeks)	35.8 (2.0)	37.0 (2.6)
Pre-pregnant BMI (kg/m^2) **	23.8 (3.3)	29.7 (6.1)
Systolic blood pressure (mm Hg) **	117.4 (7.9)	141.6 (11.9)
Diastolic blood pressure (mm Hg) **	72.0 (4.9)	90.1(9.9)
Gravida	1.6 (1.1)	2.0 (1.8)
Parity	0.4 (0.8)	0.7 (1.2)
Note: **denotes significant group differences, $p < .01$.		

Data Analyses

T-tests were used to examine the data for the two diagnostic groups for: 1) the maternal characteristics; 2) birth outcome measures; and 3) fetal heart rate accelerations and decelerations. One between (group), one-within (posture) analyses of variance (ANOVA) were used to analyze the heart rate variability and spontaneous baroreflex data. Because the maternal measures were significantly intercorrelated, regression analyses were used to examine the relations between the maternal and the fetal heart rate measures. For these analyses, an interaction term between diagnostic group and parasympathetic nervous system indicator change was calculated in order to examine group differences in the association between maternal parasympathetic nervous system indicator and fetal cardiac behaviour.

Results

Sample characteristics

As can be seen from Table 1, at time of testing, the maternal groups did not differ in average maternal age, gravida, parity or gestational age of fetus at time of testing. However, average body mass index, systolic and diastolic blood pressures were all significantly higher in the preeclamptic compared to the normotensive group. The newborns of women with preeclampsia were delivered earlier (37.7 weeks GA) and weighed less (2999 g) than those of normotensive women (40.3 weeks GA and 3584 g, respectively).

Measure	Normotensive (n = 18)		Preeclamptic (n = 9)		Significant Differences
	Lying	Standing	Lying	Standing	
HF (ms^2/Hz)	67.7 (72.7.0)	71.4 (57.1)	182.0 (351.1)	173.4 (308.8)	BP group
LF (ms^2/Hz)	85.3 (56.2)	141.3 (152.8)	83.5 (75.9)	74.6 (64.4)	
TP (ms^2/Hz)	489.7 (241.1)	639.8 (323.9)	474.9 (519.1)	656.0 (580.1)	position
PNS (HF/TP)	0.12 (0.09)	0.11 (0.06)	0.24 (0.22)	0.20 (0.29)	BP group, position
SNS (LF/HF)	1.9 (1.2)	2.8 (2.5)	1.6 (1.5)	4.5 (5.2)	position
ABP (mm Hg)	97.1 (11.2)	112.8 (14.7)	114.9 (10.5)	142.6 (8.6)	BP group, position
RRI (ms)	697.0 (60.1)	650.3 (46.2)	710.4 (74.1)	646.1 (131.0)	position
SBR (ms/mm Hg)	7.6 (3.8)	6.5 (2.5)	7.1 (4.7)	7.0 (8.4)	
Note: HF, high-frequency power; LF, low-frequency power; TP, total power; PNS, parasympathetic indicator; SNS, sympathetic indicator; ABP, systolic blood pressure; RRI, R-R interval; SBR, spontaneous baroreflex sensitivity; BP group-diagnostic group.					

Maternal cardiac autonomic function

The heart rate variability data for the two groups are shown in Table 2. Because there were differences in the variance in the parasympathetic nervous system and sympathetic nervous system indicators for the two groups of women and the distributions were skewed for the preeclamptic group, log transformations were performed on these data prior to further analyses. One between (diagnostic group), one-within (posture) ANOVAs were used to examine changes in each of these measures. For the heart rate variability measures, there was a diagnostic group (i.e., preeclamptic or normotensive) difference in high frequency power, $F(1,25) = 5.68, p < .05$, and a position effect on total power, $F(1,25) = 5.09, p < .05$, leading to group, $F(1,25) = 4.78, p < .05$, and position, $F(1,25) = 9.02, p < .05$, effects on the parasympathetic nervous system indicator and a position effect on the sympathetic nervous system indicator, $F(1,25) = 4.78, p < .05$. The preeclamptic group had higher parasympathetic nervous system indicator levels than the normotensive group while the parasympathetic nervous system indicator decreased from lying to standing and the sympathetic nervous system indicator increased. For the components of the spontaneous baroreflex slope, these analyses showed significant differences between the normotensive group and the preeclamptic group for the systolic arterial blood pressure, $F(1,25) = 44.68, p < .01$, and a position effect for systolic arterial blood pressure, $F(1,25) = 43.28, p < .01$ and R-R interval, $F(1,25) = 24.59, p < .01$. However, there were no significant group differences on position change for spontaneous baroreflex.

Gestational Age

Repeated measures ANOVA were performed for each diagnostic group separately using GA at testing as a covariate. The normotensive group showed no effects of GA on any maternal measure, while the preeclamptic group showed an effect of GA on the parasympathetic nervous system indicator, $F(1,7) = 18.1, p < .01$; the sympathetic nervous system indicator, $F(1,7) = 25.5, p < .01$; and baroreflex sensitivity, $F(1,7) = 24.6, p < .01$. The effect of standing on these measures changed with increasing GA; there was a decrease in the parasympathetic nervous system indicator, $r = -.89, p < .01$, and BRS, $r = -.80, p < .01$ and an increase in the sympathetic nervous system indicator, $r = .70, p < .05$, in the standing position as the gestational age of the fetuses increased.

Fetal measures

Table 3 shows the mean number of heart rate accelerations and decelerations seen during the non-stress test (NST) procedure for the preeclamptic and normotensive groups. Student t-tests on these data showed significant differences between the two groups on fetal heart rate accelerations obtained during the NST procedure [>10 bpm, $t(26) = 2.36, p < .05$; >15 bpm, $t(26) = 2.16, p < .05$] while correlation analyses showed no effect of gestational age on any fetal heart rate measure.

Relation between maternal heart rate variability and fetal heart rate

Initial regression analyses were conducted using the backward method to examine possible relations between baseline blood pressure, maternal age and gestational age at testing and fetal heart rate change during the 20-minute NST. Fetal measures included the number of heart rate accelerations equal to or greater than 10 and 15 bpm and decelerations equal to or greater than 10 bpm (as no fetus in the preeclamptic group had any decelerations equal to or greater than 15 bpm). None of the maternal measures were related to any of the fetal measures and were not considered further.

Regression analyses were again conducted to examine relations between maternal heart rate variability measures and fetal heart rate. Diagnostic group and pre-pregnancy body mass index were

Table 3
Means (+ SD) for fetal heart rate accelerations and decelerations in normotensive and preeclamptic pregnancies.

Measure	Normotensive (n=18)	Preeclamptic (n=9)
FHR accelerations > 10 bpm*	7.63 (4.8)	4.25 (3.6)
FHR accelerations > 15 bpm*	3.31 (3.3)	1.25 (1.8)
FHR decelerations > 10 bpm	2.05 (2.1)	.75 (1.6)
FHR decelerations > 15 bpm	.26 (.7)	0

Note: * denotes significant group differences $p < .05$; FHR, fetal heart rate; bpm, beats per minute.

included in all analyses. Separate analyses were performed first in the lying position then standing for the maternal measures (parasympathetic nervous system indicator, sympathetic nervous system indicator and spontaneous baroreflex slope). In addition, the effect of the change in the measures from lying to standing was examined and proved to be the better predictor. Diagnostic group and the parasympathetic nervous system indicator change were significantly related to the fetal heart rate measures, thus an interaction between the two measures was examined. To determine whether the effect of the parasympathetic nervous system indicator change was different for the two groups, an interaction term was entered into the regression analyses. A total of 49% of the variance in the number of accelerations was accounted for by diagnostic group, $t(23) = -2.38, p < .05$; parasympathetic nervous system indicator change, $t(23) = -3.75, p < .05$; and their interaction change, $t(23) = 2.21, p < .05$. In general, fetuses in the normotensive group had more heart rate accelerations than those in the preeclamptic group, and the greater the maternal decrease in the parasympathetic nervous system indicator from lying to standing, the greater the number of fetal heart rate accelerations ($r = .65$ for the normotensive and $r = .58$ for the preeclamptic group) and this change was less for the preeclamptic group than for the normotensive group.

Discussion

The purpose of this study was to compare the pattern of short-term maternal autonomic modulation of heart rate and spontaneous fetal heart rate changes in preeclamptic and normotensive pregnancies and to explore possible relationships between maternal autonomic and fetal cardiac responses. As expected, because of the inclusion criteria, women in the preeclamptic group had higher average systolic and diastolic blood pressure compared to women experiencing an uneventful, normotensive pregnancy. Their average blood pressure was $> 140/90$ mm Hg, meeting the definition of hypertension as it relates to preeclampsia (Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy, 2000). In addition, women who developed preeclampsia had a higher pre-pregnancy BMI than those who remained normotensive throughout pregnancy. The average BMI (28.9) for women with preeclampsia fell into the overweight category (BMI 25-29.9), whereas the average BMI (23.8) of normotensive women was in the normal weight group (BMI 18.5-24.9) (Health

Canada, 2003). These results support previous research. Duckitt and Harrington (2005), reviewing the literature, found that the risk of preeclampsia is increased in women who are classified in the overweight and obese categories compared to the normal weight category. The Canadian guidelines suggest that the risk of chronic hypertension is increased in the general population for those who are classified in the overweight category. Moreover, increased weight, especially obesity (BMI > 30), is considered to be a modifiable risk factor for cardiovascular disease.

In general, pregnancy is associated with changes in maternal hemodynamics. There is an average increase of approximately 50% in total blood volume progressively from the beginning of the second trimester to about 36 weeks GA (e.g., Silver, Seebeck, & Carlson, 1998). Blake and colleagues (2000) have reported changes in sympathetic control in each trimester of pregnancy in normotensive women. Also, there is an increase in peripheral vascular resistance after early second trimester, resulting in a gradual increase in blood pressure after the twenty-eighth week of gestation (Paller, 1998) that is greater in hypertensive pregnancies (Airaksinen, et al., 1996). The present study was restricted to the last six weeks of gestation and showed changes in the autonomic nervous system responses of women with preeclampsia over the length of gestation. In this group, the parasympathetic nervous system indicator was inversely related to the length of gestation, whereas the sympathetic nervous system indicator was positively related. These results are somewhat similar to those found by Brown et al. (2005) who found correlations between the low frequency, high frequency and total power components of the parasympathetic and sympathetic indicators with gestational age in a hypertensive group, but not in a normotensive group. No other study has shown similar changes in the last trimester of pregnancy. We speculate that in hypertension and preeclampsia, the hemodynamic changes related to the standing versus supine posture combined with the other physiological effects of increasing gestation contribute to this shift in autonomic control.

Although women in the preeclamptic group had higher blood pressure than those in the normotensive group, both groups showed a similar response to orthostatic stress. Typically, in the first three seconds after standing up, there is an initial fall in blood pressure, followed by a sympathetically mediated vasoconstriction whereby blood pressure recovers and sometimes overshoots (Sprangers, Wesseling, Imholz, Imholz, & Wieling, 1991). Our exclusion of the first five minutes following standing

allowed us to measure heart rate variability and baroreflex sensitivity once equilibrium had been restored. An increase in systolic blood pressure in the standing posture has previously been reported in preeclampsia and normotensive pregnancies (Blake, et al., 2000; Dyer, Anthony, Ledebor, & James, 2004). In both maternal groups, the parasympathetic nervous system indicator and the R-R interval were lower when standing than when lying in the left, lateral recumbent position, while the sympathetic nervous system indicator and arterial systolic blood pressure were increased. We also showed a difference between the groups in the parasympathetic nervous system indicator, but not the sympathetic nervous system indicator, replicating previous research (e.g., Eneroth-Grimfors, et al., 1994) that had shown preeclampsia to be associated with decreased parasympathetic control with no significant sympathetic impairment. Our results also replicated the findings of Faber et al. (2004) who reported unaltered baroreflex sensitivity in preeclamptic pregnancies when compared to normotensive pregnancies.

All fetuses examined in this study had a reactive non-stress test when scored using the clinical criteria for well-being of two or more fetal heart rate accelerations. However, when the total number of spontaneous fetal heart rate accelerations was counted, fewer accelerations were seen in the preeclamptic group than in the normotensive group. These maternal effects on fetal cardiovascular function are in contrast to Kisilevsky and Hains (2005) who found in a meta-analysis that there were no significant differences in the number of spontaneous fetal heart rate accelerations between fetuses in pregnancies complicated by hypertension (without preeclampsia) versus normotensive pregnancies. Thus, it may be that the significant reductions in fetal heart rate accelerations found here reflect the severity of maternal disease in preeclampsia.

As well, when we examined the relationship between the maternal cardiac autonomic nervous system responses and fetal heart rate accelerations, differences emerged. The results of the regression analyses showed that both diagnostic group and maternal parasympathetic nervous system indicator as well as their interaction affected the number of heart rate accelerations exhibited by the fetuses and that those in the preeclamptic group showed less effect of the parasympathetic nervous system indicator on the number of fetal heart rate accelerations (i.e., had fewer accelerations). Brown et al. (2005) who measured maternal autonomic function only in the supine position showed a somewhat similar effect of the parasympathetic and sympathetic indicators on the

actual magnitude of fetal heart rate accelerations measured in the non-stress test procedure: the fetuses of hypertensive women in that study had lower (about five bpm) accelerations than those of normotensive women. The authors speculate that there may be altered circulating catecholamine levels associated with the increase in blood pressure seen in women with hypertension. Catecholamines increase the sympathetic relative to parasympathetic nervous system influence on heart rate in the mother and consequently may influence fetal heart rate control. In fetuses, as in adults, the heart rate is controlled by an interaction between the sympathetic and parasympathetic systems. Portbury et al. (2003) have shown that catecholamines have a role to play in this regulation so that this is a possible mechanism for our findings.

In examining the above relation between the maternal parasympathetic nervous system indicator and fetal behaviour, we examined the maternal autonomic measures in more detail. In general, the parasympathetic nervous system indicator is expected to drop when standing, based on the baroreflex-mediated response to this posture. Typically, the reduction in arterial blood pressure in the standing posture leads to a series of events that result in an increase in efferent sympathetic activity to the heart and blood vessels and a concurrent withdrawal of parasympathetic activity to the sinoatrial node (Kamath, et al., 1991). While women showed no change in the sympathetic nervous system indicator as expected, we found that only approximately half of the women in the normotensive group and most of the women in the preeclamptic group showed the expected change in the parasympathetic nervous system indicator. The remaining mothers showed an increase in the parasympathetic nervous system indicator. This finding was unexpected and we cannot explain why the reverse of the expected change in the parasympathetic nervous system indicator should occur in some women. However, the fetuses of those women in the normotensive group who demonstrated the expected drop in the parasympathetic nervous system indicator from lying to standing had a greater number of heart rate accelerations than those whose mothers had an increase from lying to standing. Fetuses in the normotensive group whose mothers exhibited the unexpected change had approximately the same number of accelerations as those in the preeclamptic group whose mothers showed little effect of the parasympathetic nervous system indicator. To our knowledge, there have been no previous reports of relationships between maternal heart rate variability and fetal cardiac changes in normotensive pregnancies as revealed here.

In summary, in this exploratory study, we demonstrated relationships between maternal autonomic nervous system control of heart rate and spontaneous fetal heart rate changes in late gestation which have not been reported previously in preeclamptic pregnancies. These findings serve to further our understanding of the pathophysiology of preeclampsia and its effect on the fetus. While it is well-known that preeclampsia is associated with long-term maternal risk of developing hypertension and cardiovascular disease and is associated with later cardiovascular risk factors in the offspring, little is known about the development of precursors of risk factors for cardiovascular disease in the fetus. It is clear from this study that there is an association between the magnitude of the change in maternal autonomic nervous system control of cardiac function and fetal heart rate changes in preeclampsia that may indicate a relation between the severity of the maternal disease and the severity of the effects on fetal cardiac function. Even though the findings are preliminary, implications for cardiovascular nursing practice are beginning to emerge. These include evidence: 1) identifying atypical maternal autonomic nervous system modulation of short-term cardiovascular function in preeclampsia, especially during standing, which may need to be monitored during and following pregnancy, 2) indicating that maternal hypertension and maternal body weight (i.e., in the overweight/obese category),

which are modifiable risk factors for cardiovascular disease also may be modifiable risk factors for preeclampsia, suggesting prevention through health education in pregnant women and women of childbearing age and 3) confirming a negative effect of preeclampsia on fetal heart rate accelerations which may influence interpretation of fetal heart rate recordings used in the assessment of well-being. Firm conclusions and specific implications for cardiovascular nursing practice await replication and extension of this work. ♥

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Cardiovascular Health in Canadian Women: The Bigger Picture Revisited

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Cardiovascular disease (CVD) is the leading cause of death in Canadian women. Recent projections suggest that the number of cardiovascular-related deaths among women will continue to increase for at least another decade (Heart & Stroke Foundation of Canada, 2003). Nurses are in pivotal roles to facilitate the development of strategies to promote cardiovascular health and prevent CVD in this population. These strategies must move beyond the current focus on the individual, to encompass the bigger picture of population health promotion. This

paper revisits the current state of knowledge of the population-based determinants of cardiovascular health in women, incorporates a Canadian perspective by including relevant epidemiological data, and recommends strategies that extend beyond the individual to the broader community, policy, health services and research domains.

Key words: cardiovascular disease, health promotion, women

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Introduction

Cardiovascular disease (CVD), including coronary heart disease (CHD) and stroke, is a leading cause of death in Canadian women (Canadian Institute for Health Information, 2002). In 1999, almost 40,000 women in Canada died as a result of CVD (Statistics Canada, 2002). Specific to CHD, women tend to suffer with greater disability and a higher rate of morbidity than their male counterparts (Grace, Fry, Cheung, & Stewart, 2003; Oparil, 1998; Peltonen, Lundberg, Huhtasaari, & Asplund, 2000). As the baby-boomer generation is getting older and women are living longer, the impact of CVD on quality of life, as well as the Canadian economy, is expected to increase in the years to come. According to recent projections, the number of cardiovascular-related deaths among women will not only soon surpass deaths among men, but will also continue to increase until the year 2015 (Heart & Stroke Foundation of Canada [HSFC], 2003). Nurses are in key positions to effect changes in these trends, by generating strategies to promote cardiovascular health and prevent CVD in this cohort.

Population health promotion is not a new phenomenon (Evans, Barer, & Marmor, 1994; Feather & Sproat, 1996). However, the link between cardiovascular health and the population health determinants, including: income and social status, social support networks, education, working conditions, physical environments, personal health practices and coping skills, healthy child development and health services, is often overlooked. This broader perspective does not negate the significant impact of individual risk factors on CVD, but rather it moves beyond 'blaming the victim' (Labonte & Penfold, 1981) to encompass factors that influence the overall health of the population.

Strategies to promote the cardiovascular health of women must be predicated on scientific evidence. Although there has been a recent increase in the number and proportion of women participating in research (Meinert, Gilpin, Ünalp, & Dawson, 2000), there is still a dearth of cardiovascular research evidence with a particular focus on women (Wenger, 2004). As well, most of the available evidence and subsequent strategies have been directed at individuals and specific risk factors for CVD rather than populations. For example, the American Heart Association's Evidence-Based Guidelines for CVD Prevention in Women (Mosca et al., 2004) focus exclusively on individual risk factors such as smoking, physical inactivity, obesity, hypertension and diabetes. Hence, it is particularly relevant and timely to revisit the 'bigger picture' of cardiovascular health in Canadian women. An overview of the current state of knowledge of the population-based determinants of cardiovascular health in women, which incorporates relevant epidemiological data, will provide nurses with the insight necessary to guide the development of population-specific health promotion strategies for women in Canada.

The purpose of this paper, therefore, is to discuss the status of cardiovascular health promotion for women in Canada within the context of a population health promotion framework. The three-dimensional population health promotion (PHP) model (Bhatti, 1996) provides an appropriate backdrop for this discussion (see Figure 1). This model illustrates how a population health approach can be implemented through action directed at the broad determinants of health by means of the health promotion strategies first outlined in the Ottawa Charter for Health Promotion (World Health Organization [WHO], 1986), within the

various levels for action within our society (Bhatti, 1996). An overview of the current state of knowledge of these determinants, including epidemiological evidence, provides the necessary background and the context for this discussion. The paper concludes with recommendations for nursing strategies to promote cardiovascular health in Canadian women within the context of the PHP model and 'the bigger picture.'

The Determinants of Cardiovascular Health in Women

Because many of the established individual risk factors for CVD are embodied within the context of biology and genetics (e.g., family history, gender, race/ethnicity, hypertension, obesity, diabetes, hormones) and personal health practices and coping skills (e.g., diet, smoking, sedentary living, stress), the focus herein is on the remaining six determinants of health (see Figure 1). While each of these determinants will be reviewed in turn, it is important to realize that they should be considered as working together to produce health and disease in individuals and in the population (Seeman & Crimmins, 1999; Young, 2005).

Income and Social Status

Although times are changing, women still have lower incomes than men and, generally, gain less income and prestige during the course of their working lives. More than 50% of the total population with low incomes in Canada is made up of women (Lindsay, 2000). Senior women (i.e. > 65 years old) account for 24% of these statistics. The particular significance of these data is that senior women with lower household incomes tend to have lower overall health levels (Roberge, Berthelot, & Wolfson, 1995), as well as higher rates of CVD mortality (Diez Roux, Borrell, Haan, Jackson, & Schultz, 2005) than those with either middle or high incomes.

The literature reflects fairly consistent evidence of a strong association between higher income and social status and better health (Kaplan & Keil, 1993). It follows that men and women in higher income brackets generally have longer life expectancies and more years of life free of activity restrictions than their lower income cohorts (Federal, Provincial, & Territorial Advisory Committee on Population Health [FPTACPH], 1994; Kaplan & Keil, 1993; Wilkins, Berthelot, & Ng, 2002). As well, self-perception of health has been positively associated with level of income in Canadians overall (FPTACPH, 1994) and within the specific cohort of aging women (Sawatzky & Naimark, 2002).

The evidence linking socioeconomic status (SES) and CVD was less than consistent until the mid-1970s (Eaker, 1989). However, in more recent studies, correlations between CVD and income tend to follow the general health and disease trends. For example, in

the Saskatchewan Heart Health Survey, Reeder, Liu and Horlick (1996) found that CVD was more prevalent in those with low annual household incomes (i.e. < \$25,000) than in those with higher annual incomes (i.e. > \$49,000). There is also population-based evidence (Choinière, Lafontaine, & Edwards, 2000; Statistics Canada, 2000) that modifiable risk factors for CVD, such as smoking, physical inactivity, being overweight, high blood pressure and diabetes are inversely related to income, particularly in women. Recent research utilizing the 1998-99 National Population Health Survey highlights the significance of these trends for the sub-group of single mothers (Young, James, & Cunningham, 2004). Young and associates found that lone mothers not only reported lower incomes, but also they were more likely to be smokers, and had higher distress and depression scores than partnered mothers.

There are no definitive answers as to why higher income and social status are associated with better health. The assumption that substandard living conditions, including the inability to afford healthy food choices, is the major cause of poor health is not supported by epidemiological evidence. When examined from this population perspective, "the health gradient does not just occur between the highest and lowest status groups, but throughout the entire spectrum. Poverty is not the entire explanation" (Young, 2005, p. 152).

Considerable research does, however, support the hypothesis that a sense of control is a common denominator. For example, those with higher incomes and social status tend to have more control over their life circumstances (Muntaner, Sorlie, O'Campo, Johnson, & Backlund, 2001). Specific to CVD, in recently published findings from the INTERHEART study, with data from 52 countries, Rosengren and associates (2004) provided convincing evidence that high locus of control is a significant protective factor against myocardial infarction. This may have particular repercussions for women, because they generally have lower incomes than men and are generally relegated to positions of lower status and, consequently, less control. Moreover, according to a report by the National Forum on Health (1997):

Income affects a woman's access to education, child care, some health care and types of employment, her actual or potential dependence on welfare payments, the safety of her neighbourhood, and her ability to obtain good and affordable housing and nutrition for herself and her children (p. 4).

This assertion lends support for directing our cardiovascular health promotion efforts towards the social and economic environment, as well as the context of women's lives.

Education

Over the past several decades, there have been remarkable strides in the educational achievements of Canadian women. There are fewer women with secondary education or less, because more women are completing post-secondary education and university degrees. In fact, women are now surpassing men as full-time students in Canadian universities (Normand, 2000). This trend is also reflected in the analysis of educational attainment by age, with the younger generation (i.e., 25 to 44 years) generally being better educated than their aging counterparts (Normand, 2000). Nonetheless, the gradient of decreasing education with increasing age is of concern because this increases the risk of ill health in the already vulnerable, aging population (Sundquist & Johansson, 1997).

Using education as its primary indicator of social class, the Stanford Five-City Project (Winkleby, Fortmann, & Barrett, 1990) found striking associations between level of education and six prominent risk factors for disease, including knowledge about health, cigarette smoking, hypertension, height, body mass index and total cholesterol. Similarly, a more recent prospective epidemiological study in Sweden (Sundquist & Johansson, 1997) reported higher risks of mortality for persons with a low SES, as measured by education. As well, Canada's Health Promotion Survey found that self-rated health status ranked as fair or poor, as well as activity limitation, decreased with increasing levels of education (Health & Welfare Canada, 1990).

Specific to CVD, the Tromso Heart Study (Jacobsen & Thelle, 1988) reported comparable findings for CHD risk factors and social class as measured by level of education. In this study, both men and women with less education were more overweight, smoked more, were less physically active, had higher mean serum total cholesterol levels and systolic blood pressures and ate a more atherogenic diet than their more educated counterparts. The results of several Canada-wide population-based surveys generally concur with these findings (Millar & Wigle, 1986; Reeder et al., 1996; Statistics Canada, 2000). Moreover, researchers in the Saskatchewan Heart Health Survey found that "the level of household income and education turned out to be the strongest social correlate of CVD" (Reeder et al., 1997, p. 275). Thus, there is consistent evidence of an inverse association between education and CVD in both men and women. It is important, therefore, to determine the reasons for this relationship, because therein may lie the solution. Winkleby and associates (1990) suggest that higher education contributes to health and protects against disease by:

facilitating the acquisition of positive social, psychological, and economic skills and assets and/or by providing insulation from adverse influences. Beneficial assets that may accrue with education include positive values and attitudes about health, higher self-esteem, effective coping skills, access to preventive health services, and entry into a social milieu where the adoption or continuation of positive health behaviour is reinforced (p. 9).

Employment and Working Conditions

One of the most dramatic changes in Canadian society over the past several decades has been the growth in the number of women who are employed outside the home (Zukewich, 2000). However, the percentage of men in the labour force is still much higher than women (i.e., 67% versus 46% respectively), and more women than men work part-time (i.e. < 30 hours/week). Although many women prefer to work part-time, a growing number want and need full-time employment. It is also important to acknowledge that women's work differs from that of men. While there has been some progress in recent years, 70% of all employed Canadian women are still in traditional teaching, health-related, clerical, or sales and service occupations, whereas men continue to dominate employment in management, engineering, trades and construction (Zukewich, 2000). As well, the multiple, unpaid roles of women, including spouse, parent and caregiver, are rarely recognized as real work.

Generally, employed men and women are healthier than their unemployed counterparts, even after adjustment for education and income (Brezinka & Kittel, 1995; Jin, Shah, & Svoboda, 1995; Klumb & Lampert, 2004). In a comprehensive review of research related to women, work and well-being, Klumb and Lampert (2004) found that paid employment had no adverse effect on women, and it was, in fact, consistently associated with less psychological distress. However, it is also important to note that the effects of unpaid work, such as high levels of caregiver burden, have been found to significantly increase the risk of CVD in women (Lee, Colditz, Berkman, & Kawachi, 2003).

On the other hand, unemployment is often associated with ill health. Specific to CVD, Jin and associates' (1995) review of scientific data revealed consistent evidence of a strong, positive association between unemployment and many adverse health outcomes, which included overall morbidity and mortality related to CVD. In addition, unemployment combined with being unmarried has multiple interactive disadvantages, including the increased risk of poverty, lack of social support and poor health (Waldron, Weiss, & Hughes, 1998).

It follows that one of the theories related to the apparent protective effect of employment on one's health is that the social support and social networks that tend to develop in the workplace may contribute to a sense of well-being. Conversely, the social isolation and poor quality of social support that often results from unemployment may contribute to the increased morbidity and mortality (Roberts, Pearson, Madeley, Hanford, & Magowan, 1997). While caregiving responsibilities may also diminish the opportunity to receive social support, caregiver health risk is compounded by the lack of time to engage in self-care and preventive health behaviours (Lee et al., 2003).

There is also research evidence to suggest that not all individuals are affected in the same way by their employment status. While employment does appear to provide women with some protection against CVD, it is important to note that more recent studies are reporting that white-collar workers have a more favourable risk factor profile than their blue or pink-collar counterparts (Luoto, Pekkanen, Uutela, & Tuomilehto, 1994; Steptoe & Willemsen, 2004). A sense of mastery and control over one's life seems to have a significant impact on the relationship between employment and health. This assertion is supported by research evidence of increased stress and stress-related behaviours/symptoms, including an excess of alcohol consumption, cigarette smoking, hypertension and functional decline in women with low job control (Cheng, Kawachi, Coakley, Schwartz, & Colditz, 2000; LaRosa, 1988; San José, Van Oers, Van de Mheen, Garretsen, & Mackenbach, 2000; Steptoe & Willemsen, 2004), as well as lower perceived stress scores and more health-promoting behaviours in higher level occupations (Sawatzky & Naimark, 2002).

Thus, strategies to reduce specific cardiovascular risk factors in women must include an awareness of employment status and working conditions, as well as the multiple roles of homemaking, parenting and, perhaps, caregiving responsibilities.

Social Support Networks

It is generally accepted that social relationships and interactions have a positive impact on one's health and a protective effect against disease, and even death. This assertion is based primarily on extensive research literature within the social epidemiology domain (Kawachi, 1999). Similar findings have been reported for CVD in general, and CHD in particular (Ford, Ahluwalia, & Galuska, 2000; Kaplan, et al., 1988; Kawachi et al., 1996). While the results of epidemiological investigations involving women have been less consistent, according to Eaker (1989), this may be because "different components of social support are important for health outcomes in different populations and in different age groups" (p. 170).

The term 'social capital' has been coined to refer to the "interpersonal trust and norms of reciprocity and mutual aid – that facilitate collective action for mutual benefit" (Kawachi, 1999, p. 121). This extends the concept of social support to encompass a broader perspective such as neighbourhoods and communities. Research evidence suggests neighbourhoods that are stable over time and enriched with social capital may serve to reinforce healthy behaviours and risk reduction efforts (Kawachi, 1999; Seeman & Crimmins, 1999). Unfortunately, however, and particularly in women, "social ties can also be a source of demands, conflict, embarrassment, envy, disappointment and devaluation as well as serving as models for risky or unhealthy behaviours" (Seeman & Crimmins, 1999, p. 94).

Although the question of how a lack of social support networks exerts a negative effect on health remains unanswered, speculations abound. While it may be that social conditions alter biological/physiological mechanisms or health behaviours, the prevailing hypothesis is that inadequate support and social isolation result in a chronically stressful state. Conversely, "support from family, friends and acquaintances could be very important in helping people solve problems and deal with adversity, as well as maintaining a sense of mastery and control over life circumstances" (FPTACPH, 1994, p.16). In addition, "the caring and respect that occurs in social relationships, and the resulting sense of satisfaction and well-being seem to buffer against health problems" (FPTACPH, 1994, p.16).

It is interesting to note that women are generally somewhat protected from this health disadvantage because they tend to have more social contacts outside of marriage than their male counterparts (Shumaker & Hill, 1991). Based on her observations of men and women over time, Cornwell (1984) concluded that women appear to have an advantage over men because "in general, the early lives of the women seem to equip them to survive old age less unhappily than the men, principally because they are more sociable and remain involved with other people" (p. 80). Men, on the other hand, tend to develop work relationships, which do not survive into the retirement years. Moreover, men "often cite their spouses as their only confidants, whereas women cite spouses and friends with about the same frequency" (Shumaker & Hill, 1991, p. 107). Hence, aging men are more likely to become isolated when the traditional marital role is disrupted and when there is no wife to maintain the supportive connections.

The concern, however, is that women are now living longer than men and, as a consequence, may be at increased risk for social isolation. For example, an

aging male is more likely to be taken in by a family member or friend than his female counterpart. According to Statistics Canada (Lindsay, 2000), more than 38% of senior women, compared to 16% of senior men, were living alone in 1996. Moreover, the likelihood that a senior woman will live alone increases with age (Lindsay, 2000). Many older women are also being deprived of social support and interaction because of constraints related to the care-giving responsibilities of an ill spouse or aging parent (National Forum on Health, 1997; Shumaker & Hill, 1991). Finally, because socioeconomic disadvantage and lack of social capital are often intimately entwined (Kawachi, 1999), aging women, as well as single mothers are at particular risk for the consequent cumulative negative health repercussions.

Thus, an awareness of the changing trends, as well as the importance of social support and social capital for women's health, provides direction for individual, community and population based cardiovascular health promotion strategies.

Physical Environments

Discussions related to the physical environment as a determinant of population health generally include the broader perspective of what Hippocrates referred to as air, water and places. Although the respiratory system bears the brunt of the negative consequences, air pollution, especially tobacco smoke, also has a significant impact on the cardiovascular system. Smoking rates among young women in Canada are an ongoing concern, especially because they are associated with lower education and income, heavier drinking practices and inactivity (Maclean, Glynn, & Ansara, 2003). Secondhand smoke, on the other hand, is an environmental issue for all Canadians.

The water we drink and the food we eat have come under much scrutiny in the past several years, with chemical and biological agents threatening their safety and nutritious quality. Finally, although most of us take shelter for granted, we cannot ignore the unfortunate reality that many Canadians are homeless or living in dwellings that are not fit for human habitation, a significant proportion of which are women.

Thus, while at first glance it may seem that the physical environment has little impact on our cardiovascular health, there is no question that the air we breathe and the food we eat have toxic effects on our cardiovascular system. In addition, the places Canadian women live are often less than ideal, which may contribute to the chronic stressful states that precipitate a wide range of health problems, including CVD (Boardman, 2004; Diez Roux, 2003). In fact, neighbourhood socioeconomic characteristics have been linked to cardiovascular risk factors such as smoking, body mass

index, dietary patterns, blood pressure and blood lipids (Diez Roux, 2003). An awareness of the significant influence of the broader physical environment on women's health should lead to health promotion initiatives that address the unique issues of this vulnerable population.

Healthy Child Development

Although most of the factors affecting a child's development are encompassed within the other determinants of health, it is important to note that "there is accumulating evidence that the effect of prenatal and early childhood experiences on subsequent health, well-being and competence is more powerful and long lasting than had previously been understood" (FPTACPH, 1994, p. 23). For example, Schaefer-Graf and associates (2005) recently reported that birth weight and parental obesity were significant predictors of overweight in children of mothers with gestational diabetes. On the other hand, low birth weight has also been associated with a multitude of problems that extend from infancy into adulthood, including endothelial dysfunction in young adults (Leeson, Kattenhorn, Morley, Lucas, & Deanfield, 2001).

Low birth weight has been linked to low income levels of the mother (FPTACPH, 1994). Once again, there is evidence of a gradient, from poorest to wealthiest, rather than just the most economically disadvantaged being affected. This suggests that, although poor maternal nutrition and health practices are, in part, to blame, factors such as coping skills and a sense of control may also play an important role in these findings (FPTACPH, 1994). This research evidence supports the promotion of 'heart health' in young women because, clearly, the cardiovascular health of the child is influenced by the lifestyle behaviours, and the broader health determinants of the mother.

Cardiovascular risk factors are also influenced by lifestyle behaviours that begin in childhood. Diet, for example, affects serum lipid and lipoprotein levels at a very young age. As well, children, especially young girls, are smoking at a remarkably young age and engaging in minimal physical activity (Fraser, 1986; HSFC, 2000; Taubert, Moller, & Washington, 1996). Unfortunately, the behaviours established at a young age tend to follow the individual into adulthood. The obese, inactive child is at risk to be an obese, inactive adult (Strong & Kelder, 1996). In Canada, childhood obesity has become increasingly prevalent over the past two decades (Ball & McCargar, 2003). Moreover, obesity and physical inactivity are strongly related in Canadian adolescents (Janssen, Katzmarzyk, Boyce, King, & Pickett, 2004). Thus, health promotion strategies that focus on children and youth have the

potential to positively influence their health and well-being in later life. Specific to CVD, “identifying children with risk factors and altering their lifestyles (for a lifetime), should reduce the prevalence of adults with these behaviours, and hence, reduce prevalence of CAD” (Strong & Kelder, 1996, p. 435). However, while it may be that overweight and obesity in children intersects with SES (Danielzik, Czerwinski-Mast, Langnäse, Dilba, & Müller, 2004), the issues related to the relationship between SES and excess body weight are complex and not well-understood (Young, Cunningham, Buist, 2005). Therefore, strategies for healthy child development must encompass mother and child, as well as the broader population health perspective.

Health Services

Until the introduction of the Health Field Concept (Lalonde, 1974), health services were credited as being central to, if not blamed for the health and disease of Canadians. For the first time, it was acknowledged that patterns of morbidity and mortality may be less amenable to health care interventions than factors such as human biology, lifestyle and the environment. Thus, the Lalonde Report (Lalonde, 1974) provided the premise for a paradigm shift from health services as strictly for disease treatment, to a focus on disease prevention, as well as health promotion strategies. Since its

inception, the ideology of this paradigm shift has been fervently endorsed by the various stakeholders, however, it has yet to be realized. As well, although Canadians today are blessed with universal hospital and medical care programs, the following discussion highlights how the utilization and provision of health services are not equitable, nor are the available services necessarily appropriate, particularly for women.

The management of CHD is an exemplar of the pervasive inequities in the provision of health services. In women, symptoms of CHD were reportedly ignored for many years. For example, in 1991 Steingart and associates (1991) found that “although women experience chest pain as their chief symptom more frequently than men, fewer women are referred for non-invasive tests for coronary artery disease” (p. 226). While subsequent research has provided substantive evidence to support the uniqueness of women’s presenting symptoms (Charney, 2002; DeVon & Zerwic, 2003; Patel, Rosengren & Ekman, 2004), gender bias persists in the treatment provided (Daly et al., 2000; HSFC, 2003; Sheifer, Escarce, & Schulman, 2000; Simpson, Hannaford, & Williams, 2005; Young & Little, 2004). The result is that women tend to be older and sicker when they do enter the system and, consequently, they have less favourable outcomes than their male counterparts (Lindquist et al., 2003; Peltonen, et al., 2000).

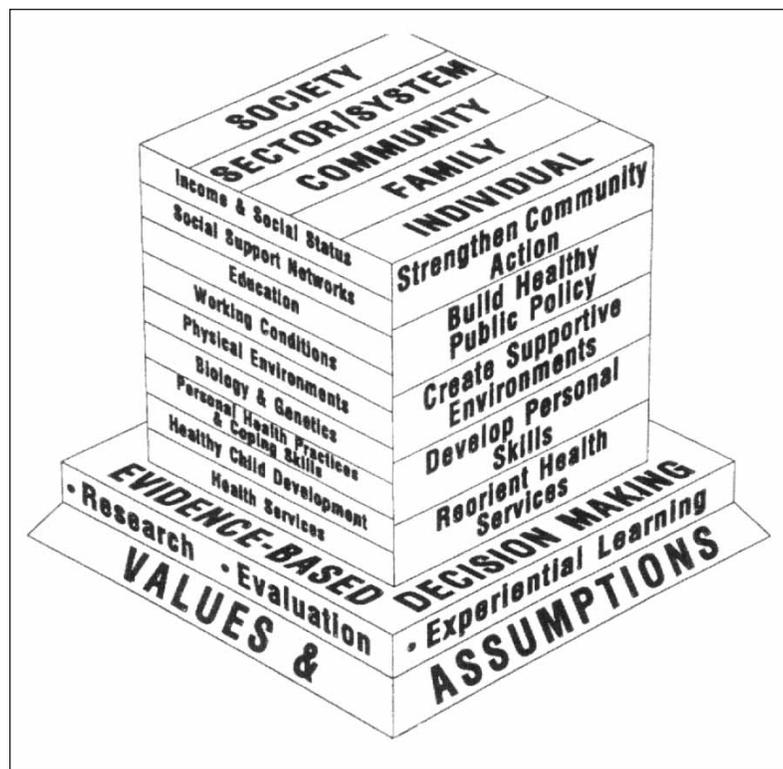


Figure 1. The Population Health Promotion Model (Bhatti, 1996). Reprinted with permission.

Although there have been some more encouraging findings, including a Canadian study in which researchers found that once patients proceeded to angiography there were no gender differences in the rates of revascularization (Jaglal, Goel, & Naylor, 1994), skeptics would argue that this is simply an example of the ‘Yentl syndrome’ (Healy, 1991), which is based on the notion that a woman is only treated like a man when she looks/acts just like a man. While a more recent study also reported that there were no significant gender differences in coronary angiography during hospitalization, it was also noted that once a woman is discharged, she is less likely than a man to have this invasive diagnostic procedure (Wong et al., 1998). Based on their findings, Wong and associates propose that a woman’s social situation may affect her compliance with recommended procedures. Therefore, addressing the potential influence of psychosocial factors, such as financial resources and social capital, are central to improving the management of women with CHD.

Clearly, there are ongoing gender inequities associated with the provision of cardiovascular-related health services. The following discussion will highlight the pivotal role for nursing in the continuing efforts to eliminate these inequities through research, as well as education of the public and health care professionals regarding the unique aspects of CVD in women.

Recommendations

This brief overview of the population determinants of cardiovascular health in Canadian women reinforces the importance of moving beyond the focus on individual risk factors and 'victim blaming' strategies to include a broader perspective for the promotion of cardiovascular health in this population. Advocates of a population approach to health promotion endorse strategies that are based on research-based evidence, and encompass the individual, as well as the broader community, policy and health services domains. These strategies include: developing personal skills, creating supportive environments, strengthening community action, reorienting health services, building healthy public policy and gathering research-based evidence (see Figure 1).

The Ottawa Charter (WHO, 1986) advises that an enabling approach to personal and social development should include broader strategies to improve the knowledge of health and the enhancement of life skills. In theory, this will facilitate an increased sense of control over one's health and the ability to make healthy choices. According to Hughes and Hayman (2004),

It is only when women perceive that CVD is a relevant health issue for them that they will seek screening opportunities to identify and quantify their personal CVD risk, adopt lifestyle changes to reduce risk, partner with their healthcare providers in initiating and persevering with evidence-based pharmacologic therapies and respond promptly to symptoms (p. 145).

It is important, therefore, for nurses to continue to advocate for public education efforts such as awareness-raising campaigns and educational health programs to create supportive environments for women of all ages, and for the aging Canadian woman in particular. From a population health perspective, this cohort is at an indisputable disadvantage and, therefore, should be the focus of health promotion efforts to ensure that they have the tools to enable them to take control of their own health.

There is general agreement among advocates of population health promotion that health is created and sustained in communities. A health-oriented community, which is robust in social capital, provides its members with a good environment in which to live,

as well as incentives to live in a way that promotes health. While there are a wide variety of opportunities in community settings, cardiovascular health promotion initiatives must move into the schools, because "the seeds for the physical and emotional health of adult women are sewn in childhood" (Wentz, 1994, p.2).

Statistical evidence regarding the dramatic increase in the female workforce over the past several decades strengthens the argument for workplace health promotion policies. Although it is critical that these policies target individual risk factors for CVD, including physical inactivity, smoking and obesity, there must also be a move to include strategies that address the broader context of women's work and their lives overall. Policies that acknowledge these unique circumstances and the broad determinants of health, including income, education, working conditions and social support will go far to making a difference in the cardiovascular health of Canadian women.

To date, reductions in cardiovascular risk factors have been greater within the higher SES population, in part because the large CVD education campaigns and intervention programs of the 1980s and 1990s reached predominantly middle income men and women (Gettleman & Winkleby, 2000). Therefore, it is critical for community-based strategies to be developed with a sensitivity to the context of the lives of women most at risk for CVD. Strategies that involve these women in the planning of intervention programs will instill a sense of empowerment, control and confidence to change their personal behaviours, as well as enable them to become active participants in their community (Gettleman & Winkleby, 2000).

Specific to health services, there must be an ongoing conviction by health professionals to ensure that there is no disparity in the provision of care for women entering Canada's health care system. The perception that CVD is a man's problem is not unique to the lay public. Professional educational initiatives to increase the awareness and knowledge in the medical and nursing community are "an important vehicle to change knowledge and attitudes" (Hughes & Hayman, 2004, p. 146). Quality improvement initiatives in areas where gender disparities may still be pervasive, such as emergency rooms, coronary care units and cardiac rehabilitation programs are also central to this cause (Hughes & Hayman, 2004).

In the political arena, the most important strategy for promoting cardiovascular health in women is advocating for healthy public policies that address the socioeconomic determinants of health. According to the Canadian Public Health Association (1996), "we need to give more emphasis to policies that create

healthy living conditions and work to ensure that the voices of society's least powerful express their concerns in these policy issues" (p. 3). We must address the issues of these disparities head-on, or there is unlikely to be any significant improvement in the overall cardiovascular health of women in Canada.

Finally, strategies for cardiovascular health promotion in women must be grounded in research-based evidence. The mounting evidence related to individual cardiovascular risk factors has led to positive strategies for risk reduction, such as optimizing lipid profiles and blood pressure, preventing type II diabetes, tobacco avoidance and regular physical activity. However, there is still a paucity of research evidence that encompasses the broader context of women's cardiovascular health. For example, according to the Heart and Stroke Foundation of Canada (2003), "as a prerequisite to developing effective interventions, research is also required to provide a better understanding of the way in which socio-economic differences mediate their effects on outcomes" (p. 67). Nurses are in pivotal positions to ensure that more women are included in medical and nursing research that focuses on this broader population health perspective.

In summary, CVD is a significant, and growing health problem for Canadian women. A review of the current state of knowledge in this area substantiates the recommendation for a population approach to cardiovascular health promotion in this vulnerable cohort and builds on the conclusions drawn from the First International Conference on Women, Heart Disease, and Stroke, that....

Clearly, further action is required to achieve better health outcomes for women. Policy supportive of women's health based on science and research permits development of action agendas to reduce the burden of heart disease and stroke both globally and locally. Together, we can make a difference (Wilson, 2000, p. 727).

To this end, nurses are in key positions to advocate for collaborative efforts and partnerships between individuals, communities, policy-makers and researchers. The joint efforts of these alliances will be the driving force to achieving the goal of cardiovascular health for women in Canada. ♥

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New Hypertension Best-practice Guidelines

The High Blood Pressure (HBP) AIM initiative of the Heart and Stroke Foundation of Ontario was launched in September 2004. One of the intended outcomes of this initiative is to “improve the management of high blood pressure by primary care providers, including doctors, nurses and pharmacists. The plan creates new educational opportunities that are designed to enhance physician, pharmacist and nursing approaches to high blood pressure detection, intervention and follow-up measures.”

The Registered Nurses' Association of Ontario, through the Nursing Best Practice Guideline Program, has partnered with HSFO to support the AIM initiative by developing a nursing best-practice guideline on the management of hypertension. The goal of this document is to provide nurses with recommendations, based on the best available evidence, related to nursing interventions for high blood pressure detection, client assessment and the development of a collaborative treatment plan, promotion of adherence and ongoing follow-up.

HSFO and RNAO are pleased to announce that this guideline is being prepared for publication in September 2005, and that it has been recently endorsed by the Canadian Hypertension Education Program.

Research

R O U N D S

Participatory Action Research (PAR): A Strategy for Women's Health Research in the Cardiovascular Field?

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What is Participatory Action Research?

Participatory Action Research (PAR) is an approach to health research that combines education, action and knowledge generation, and involves some level of stakeholder participation (Green, et al., 1995). Participatory Action Research is one of a family of approaches to research, sometimes referred to as a methodology, that fall under the umbrella term 'Action Research' (Fals Borda, 2001; Green, et al., 1995; Kemmis & McTaggart, 2003; Stringer & Genat, 2004). Approaches to Action Research differ in what counts as participation, action and knowledge development. However, common to all such approaches, the researcher and those potentially affected by the research engage in collaborative relationships that follow a cyclical rather than linear process characteristic of traditional research (Fals Borda, 2001; Kemmis & McTaggart, 2003; Stringer & Genat, 2004). That is, the research process begins with fieldwork and reflection on it, then progresses to planning, action, observation and reflection, which then commences a new cycle of action, observation and reflection (Kemmis & McTaggart, 2003; Stringer & Genat, 2004).

Participatory Action Research (PAR) is a process of engagement often designed to link "traditional scientific research to a more open and educational process" (Green, et al., 1995, p. 25). While there are numerous interpretations of PAR in the health literature, across interpretations, PAR is designed to be a transformative, empowering process wherein the academic researchers and co-research create knowledge together, develop a sense of community, educate each other often by negotiating meaning, raise consciousness and mobilize for collaboratively envisioned action (Fals Borda, 2001; Green, et al., 1995; Kemmis & McTaggart, 2003; Stringer & Genat, 2004). Thus, PAR is an approach to knowledge generation consistent with the goals of health promotion

defined as a process that enables people to increase control over and to improve their health (Choudhry, et al., 2002; Green, et al., 1995). Further, PAR, with its focus on collaboration, participation and empowerment, fits with the central aims of women's health research (Green et al., 1995; Ironstone, et al. 1998; McGuire, 2001). As a scientific enterprise, PAR draws on qualitative and/or quantitative methods, with qualitative methods most evident in the health literature. Qualitative methods, when applied to a PAR process, elicit participants' voices, experiences, meanings and interpretations whereas quantitative methods generate the kind of knowledge that is highly valued by program planners and policy-makers to inform their decisions. PAR is used in health-oriented research to bridge between science and practice, educate professionals toward changing practice, develop health-related programs relevant to users, educate people as a first step in political action, generate a shared understanding between professionals and those in their care, improve working conditions and empower the marginalized (Fals Borda, 2001; Green, et al., 1995; Kemmis & McTaggart, 2003; Stringer & Genat, 2004).

PAR, with roots in political activism and organizational research, is in the early stages of evolution in health arenas (Stringer & Genat, 2004; Tolley & Bentley, 1992). Needs assessments and health program evaluations are common applications of PAR in health settings (Green, et al., 1995). One such study, completed by Arthur, Wright and Smith (2001), exemplifies how PAR can be used to advance the women's health agenda in the cardiovascular field. A study, designed to develop and implement a community-based support group for women living with heart disease, engaged 16 women who met monthly for five months in sessions facilitated by an experienced clinical nurse. Data gathered included videotapes and transcriptions of the sessions, field notes, diaries kept between sessions by the women and evaluations of the sessions. The data were analyzed

using accepted qualitative data analysis techniques. Data captured the experiences of participating in a support group and reflections on it. The interpretation of the data generated an understanding of the benefits of a community-based support group for the women, specifically, the support group helped the women cope with their emotional reactions to having heart disease, they received social support that was lacking in other venues and they acquired information about heart disease that helped them to manage their disease. Of particular interest in this study, the researchers employed a unique analytic technique “iterative analysis” to capture what was at the heart of the women’s struggle with heart disease – ongoing suffering. Thus, PAR, as applied in this study, yielded findings that shed light on the uniqueness of the experiences of women living with heart disease, and the benefits of attending a community-based support group.

Issues with Participatory Research

PAR is a complex research process designed to address the limitations of traditional research, yet its complexities pose a number of challenges. Engaging participants in a PAR study is a time-consuming, costly enterprise that is not always valued or supported by the academy (Gibbon, 2002; Green, et al., 1995). In addition to the time-consuming nature of PAR, other challenges PAR poses include: participant recruitment and retention; ethical considerations – accessing informed consent and protecting participants from harm; reconciling research interests; identifying and sorting out various roles and relationships; conflict resolution; and generating rigorous research products (Dickson & Green, 2001; Fals Borda, 2001; Gibbon, 2002; Green, et al., 1995). In spite of the challenges of PAR, studies such

as that completed by Arthur, Wright and Smith (2001) demonstrate that researchers can manage these challenges toward making a significant difference not only to women living with cardiovascular disease, but also to knowledge development in the field.

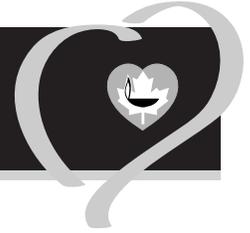
Is PAR relevant to advance women’s health in the cardiovascular field?

Women’s health as a professional enterprise has long been a complex matter. Women and their lived experiences of health have not always been valued in health arenas equally to their male counterparts (Condon, 2001; Ehrenreich & English, 1978). In the cardiovascular field, for example, women began to receive focused and diligent attention only as recently as the late 1980s. Thus, cardiovascular research is only in the early stages of serving the specific interests of women (see, for example, Krummel, et al., 2001). PAR, with its value for serving the interests of those most affected by research is well suited to advance the health agenda for women at risk for CVD, or those living with CVD. As Choudhry, et al. (2002) point out, “Women’s knowledge of their own health must be an essential component of health promotion programs” (p.75). Since PAR is consistent with the principles of health promotion, using such an approach in research has the potential to foster women’s health concurrently with generating knowledge about women’s health. Thus, PAR holds promise as an effective approach to research to advance women’s health in the cardiovascular arena. Given the issues that PAR raises for researchers, cardiovascular nurse scientists could develop networks that specifically focus on advancing PAR research methods toward moving forward the agenda of women’s health in the cardiovascular field. ♥

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