

## Development of an Educational Curriculum for Cardiac Rehabilitation Patients and their Families

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### Abstract

**Objective:** This study describes the development of an educational curriculum for cardiac rehabilitation (CR) patients and their families.

**Methods:** A committee of 16 CR experts was organized in order to develop the educational curriculum. The aim of this curriculum was to enable patients to take charge of their medical condition and respond appropriately to changes in their health, developing strategies to improve their risk factors. The curriculum's framework was adapted from the University Health Network's Framework and the Eastern Region Community College ABC program.

**Results:** The development of the curriculum consisted of the following phases: problem definition, theoretical foundation, needs analysis, program goals/educational objectives, sequencing instruction, instructional strategy/design and methods/materials, and evaluation of instruction/materials and learning for health outcomes. Constructive theory and adult learning principles were used in curriculum development and delivery. The HAPA model was embedded to guide behaviour change. The curriculum has been successfully implemented.

**Conclusion:** The educational curriculum is a sequential and theoretical strategy that can reach CR programs in order to support patients' education and behaviour change.

**Keywords:** Cardiac rehabilitation; Patient education as topic; Coronary disease; Health behaviour; Educational curriculum

### Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide, and are a significant contributor to morbidity and health-related costs [1,2]. Coronary artery disease (CAD)-the most common type of CVDs-is considered a chronic condition and, therefore, requires a careful medical management with multiple recommendations for patients to achieve optimal secondary prevention [3-5]. As a consequence, patient education is a necessary step to promote patient understanding of the recommended therapies and behaviour changes required, as well as to follow them [6-9].

Patient education has been formally defined as "the process by which health professionals and others impart information to patients that will alter their health behaviours or improve their health status" [10]. Research has demonstrated a positive effect of cardiac patient education on behaviour change, including 4 systematic reviews [11-14]. Thus, findings from a recent systematic review also support the benefits of educational interventions in CHD, through increase in patients' knowledge and facilitation of behaviour change [15].

Cardiac rehabilitation (CR) is a comprehensive risk reduction program, of which patient education is considered a core component [16]. Thus, American and Canadian Cardiovascular Societies include education as a quality indicator of CR [17,18]. According to the

Guidelines of the Canadian Association of Cardiac Rehabilitation (CACR) patient education should: be personalized; be led by a professional staff, with regular contact between staff and patients; be delivered in individual or group settings; discuss specific health goals; and seek to influence health beliefs, to elicit positive emotions, to increase optimism about the possibility of change, and to heighten the salience of personal experience or other evidence supporting self-efficacy [19]. To achieve this, a coordinated approach to developing an educational curriculum for patient education is recommended [17-19].

Although the word curriculum has its roots in the Latin word for "track" or "race course" its definition is much wider and represents the expression of educational ideas in practice, including all the planned learning experiences of an institution. Successful educational curriculums are in a form that can be communicated to those associated with the health learning (i.e. clinicians, patients, and family), are open to critique and are readily transformed into practice [20]. To our knowledge, the development of education curriculum for cardiac patients is not fully described in the literature, and there are gaps in how education should be structured in order to be effective for these patients.

This article describes the development of an educational curriculum for CR patients and their families. It also discusses the need for the program, the background and existing literature, implementation, and assessment of clinical outcomes. This process is based on two education curriculum frameworks: the University Health Network (UHN) curriculum framework [21] that guides the delivery of health

education for patients and the Eastern Region Community College ABC program [22] that guides education delivery in public colleges within Ontario.

## Context

The educational curriculum was designed for a large academic CR center in Toronto, Canada. The CR program in this location is 6-months in duration. Upon starting CR, each patient undergoes a

comprehensive assessment. Participants then come to the center for weekly classes that include exercise, education, counselling and support. In addition they are encouraged to exercise on their own at home or community centres.

The education curriculum was developed by a multi-disciplinary committee of 16 CR and patient education experts. The responsibilities of this committee are described in Table 1.

S.No.	Responsibilities
1.	Developing educational strategies to accelerate the translation of scientific discovery and knowledge to improve patient and family knowledge and skill about the prevention and treatment of cardiovascular disease. This includes a focus on areas that might improve clinician knowledge, attitudes for enhancing communication with patients and families including topics such as health literacy, cultural competence, group facilitation, motivational interviewing and the development and use of patient/family educational materials.
2.	Providing oversight for the design, implementation, and evaluation of the new educational curriculum activities and products, including a core curriculum of informational workbook and online development.
3.	Performing on-going evaluations of the educational curriculum for patients and families, as well as the general public, to determine that they are relevant, current, effective and cost-effective.
4.	Overseeing the periodic development, updating and modification of the program's educational portfolio for patients and families and conducts periodic strategic planning aimed at continued improvement.
5.	Exploring ways to ensure that the patient and family perspective is incorporated into educational activities.
6.	Ensuring that staff is best equipped to provide patient and family education and have the opportunity to provide education to other rehabilitation settings within the organization.

**Table 1:** Responsibilities of the committee of CR and patient education experts.

The development of the curriculum involved a rigorous 3-year process with multiple stages of research, analysis, and revision, consisting of the following phases: (1) problem definition, (2) theoretical foundation, (3) needs analysis, (4) program goals and educational objectives, (5) sequencing instruction, (6) instructional strategy and design, (7) instructional methods and materials, (8) evaluating instruction and materials, and (9) evaluating learning for health outcomes.

## Development of the Education Curriculum for CR Patient

### Problem definition

According to literature and guidelines, health education should be delivered not only to increase patients' knowledge but to also achieve health behaviour change [11-15,17,18]. Although studies have shown that knowledge is insufficient for generating sustained behaviour change [9], knowledge is an essential component of behaviour change because it informs patients of the probable consequences and outcomes of their choices [23]. Our program identified a gap between education and behaviour change, so the new educational curriculum was developed to consciously address behaviour change.

### Theoretical foundation

Theories are a generalized set of rules, and according to Hochbaum, et al. [24] they become important instruments to help understand and assess patient learning and motivation. A number of studies have shown that using theory in crafting interventions can lead to more powerful effects than interventions developed without theory [25-27].

In the context of patient education, theories can provide us with a workable basis for an education action we wish to undertake. This is especially important when teaching patients whose educational needs are less predictable or more diverse [28,29].

Five different theories guided us to meet our objectives of developing an education curriculum that increased knowledge and promoted and supported behaviour change. Constructivist learning theory, and adult learning theory guided the education curriculum and the HAPA model supported our efforts of incorporating behaviour change into the curriculum. Thus, self-management skills were incorporated to support the behaviour component of the new curriculum and prescriptive model to support curriculum design.

**Constructivist learning theory:** Constructivism refers to the idea that learners construct knowledge for themselves-each learner individually (and socially) constructs meaning-as he or she learns. In this context, learning is active, constructive, social, and contextual. The learner is an information constructor who actively creates their own subjective representations of objective reality. Learners take new information and link it to prior knowledge and use motivation as a key component in learning [30].

**The HAPA model:** The Health Action Process Approach (HAPA)-illustrated in Figure 1- is a social-cognition model of health behaviour suggesting that health behaviour change is a process that consists of a motivational phase and a volitional phase [31]. This model appears to have great potential as a motivational model for physical activity self-management for people with chronic problems in a variety of settings, in particular rehabilitation settings [32].

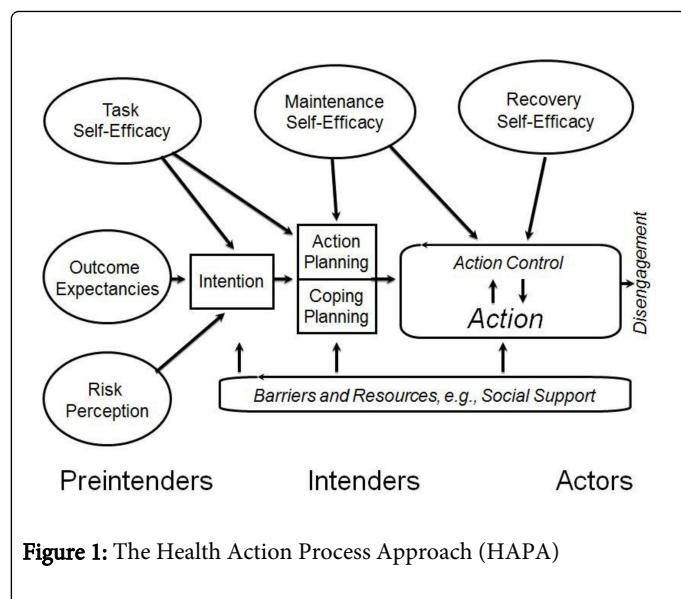


Figure 1: The Health Action Process Approach (HAPA)

**Adult learning theory:** The adult learning theory is, in fact, a set of adult learning principles and guidelines, which should be adapted to the reality of the learners and instructors [20]. The strongest influence on the practice of adult education has been the work done by Knowles [33-35], who popularized the term andragogy or “the art and science of helping adults learn”. Androgogy is based on assumptions about how adults learn, and their attitude towards and motivation for learning.

**Self-management theory:** Current evidence indicates that individuals and families who engage in self-management (SM) behaviours improve their health outcomes [36]. SM is a multidimensional, complex phenomenon that can be conceptualized as affecting individuals or families across all the learning process. The SM theory consists of three dimensions: context, process, and outcomes. In summary, the SM theory says that improvement of individual and family outcomes translate to improved outcomes for health care practitioners and systems [37,38].

**Prescriptive model:** Prescriptive models are concerned with the ends rather than the means of a curriculum. The “outcomes based education” model is recent and starts from a simple premise: the curriculum should be defined by the outcomes to be obtained by learners. Curriculum design proceeds by working “backwards” from outcomes to the other elements (e.g. content, teaching and learning experiences, assessment and evaluation) [39].

### Needs analysis

In the CR population, it has been reported that some patients understand little of what has happened to them or how to manage their lives in the aftermath of their treatments [6,7]. Unfortunately, some patients also report that they would want and need more information than they usually receive in the course of CR [5,6]. In order to plan and deliver an effective CR educational intervention, it is important to have precise information about the educational needs of the patients (i.e. how patients want their education to be) [40]. Indeed, the literature highlights the importance of a comprehensive understanding of patients’ health information needs as one of the first steps in developing educational curriculums [20]. The needs analysis

as part of our curriculum development process included the five steps described below.

**Development of a tool to assess CR patient information needs:** Despite the fact that there are studies assessing information needs of patients following revascularization [41,42], acute coronary syndrome [43,44], and myocardial infarction [45-58] to our knowledge, there were no validated tools to assess educational needs in CR patients. Therefore, we developed and psychometrically validated a tool to assess information needs in CR patients, called INCR (Information Needs in CR) [59]. The INCR Tool was demonstrated to have good reliability and validity. It was considered an appropriate tool for application in clinical and research settings, assessing patients’ needs during CR and as part of education programming [59].

**Assessment of CR patients’ information needs and CR clinical staff awareness of patients’ information needs:** In a cross-sectional study, 306 CR patients and 28 CR providers completed a survey in order to investigate CR patients’ information needs, whether CR providers are cognizant of patient’s information needs and preferred delivery formats, and whether patient information needs change over the course of CR. The survey consisted of the INCR tool, and questions about preferred education delivery formats [60].

Both patients and CR providers generally reported all 55 informational items as “important” to learn, suggesting that CR, which affords repeated contacts over time between patients and providers, must play an important role in ensuring all patients’ information needs are met. The greatest information needs identified by patients were related to medication, emergency/safety, and diagnosis and treatment, and were perceived as stress/psychological factors, emergency/safety, and risk factors by CR providers. CR providers were quite aware of patients’ information needs, except in regard to diagnosis and treatment. Finally, most additional questions CR providers reported they received by patients are included in the INCR tool, supporting its validity and comprehensiveness [59].

Overall, patient’s desired information in areas that are vital to patient survival and on-going control of symptoms, were congruent with what CR providers were teaching. In this study, there was agreement between patients and CR providers that emergency/safety was one of the highest information needs, an important result that influenced the development of the educational curriculum. Moreover, in contrast to other studies [43,59,61-63] patients identified ‘risk factors’ as one of their lowest information needs. Finally, providers should focus on educating patients of lower income, as they identified significantly greater educational needs than their high income counterparts [63].

In regards to delivery formats, lectures, books and discussions with healthcare providers were identified as the preferred formats by patients, and were also aligned with what CR providers perceived as patients’ preference. Surprisingly, patients did not desire to learn through electronic media resources such as the internet and e-learning. Despite patients’ preferences for non-electronic resources, the effectiveness of this type of technology in patient education has been described in the literature [64].

**Environmental scan of other CR programs:** In order to understand how education is delivered in similar CR programs, an environmental scan was performed. From 12 possible sources for this scan, 3 (25%) responded. Together, the programs provide a variety of education topics including exercise, medical, risk factor identification and modification and goal setting. Group and individual education is

offered as well as workshops in smoking cessation, stress and weight management. Two of the CR programs involve patients in the process of developing the curriculum for their education program (via feedback surveys). A patient needs assessment done in one cardiac rehab program resulted in their team revamping the content, amount of detail and comprehension level of the education offered to their patients and family. Modes of delivery consist of power point presentations, hand-outs, workbook and e-learning (for those with internet access). Nutrition education includes use of food models, real packaging and grocery store demonstrations. Finally, evaluation of the education programs includes some or all of the following: knowledge uptake, patient satisfaction and change in behaviour. One program provides “game days” consisting of review of the patients’

understanding of the educational material. Immediate feedback is given to the patients and incorrect responses are then reviewed with the group.

**Literature review of best practice on CR patient education:** A literature search of CR guidelines was conducted for information regarding patient education. Five guidelines were included [19,65-69]. Data was extracted and combined into 5 categories: content (educational topics and materials), special considerations (groups which education should be adjusted), effectiveness (principles for effective teaching and learning), mode (delivery format), and evaluation. Table 2 summarizes the results from this literature review.

Source	Content	Special Considerations	To be Effective	Mode	Evaluation
[19]	<p><b>Topics:</b></p> <ul style="list-style-type: none"> <li>- Risk factor target and risk factor modification (weight reduction, smoking cessation, dietary and nutrition habits)</li> <li>- Dietary habits to increase fibre, alpha-linolenic acid, fruits, nuts, vegetables, whole grains, monounsaturated fats, polyunsaturated fats, omega 3s, plant-based proteins and reduce saturated fats, simple carbohydrates and sodium)</li> <li>- Adherence to life-enhancing and/or life-prolonging prescription and non-prescription drugs. (e.g. aspirin, clopidogrel, beta blockers, statins, ACE inhibitors and/or angiotensin receptor blockers)</li> <li>- Health behaviour interventions including optimal dietary, physical activity strategies and weight control</li> <li>- Develop self-management techniques (problem solving, decision making, resource utilization, partnership formation, action planning (SMART goal setting) and self-tailoring)</li> </ul>	<ul style="list-style-type: none"> <li>- Elderly-cognitive function may be impaired; instructions need to be clear, concise and may need to be written down and frequently reviewed (often with family members)</li> <li>- Hearing impaired-clear description by video</li> <li>- Visually impaired-clear description by audio</li> <li>- Heart failure-education (and counselling) to help them adjust to the psychological, physical and social effects of living with heart failure. Importance of weighing themselves daily and how to adjust diuretic usage in response to weight gain.</li> <li>- Diabetes-foot care, proper footwear, medication adherence to diabetes meds, blood sugar monitoring and prevention/treatment of hypo and hyperglycemia.</li> <li>- Sexual health- expert education and counselling in patients with congenital heart disease, heart failure or patients who have received information about their sexual health in relation to their cardiovascular condition.</li> </ul>	<ul style="list-style-type: none"> <li>- Voluntary participants</li> <li>- Mutual respect</li> <li>- Time for critical reflection of material</li> <li>- Empowered to become self-directed learners</li> <li>- Discuss specific health goals</li> <li>- Is personalized</li> <li>- Explains the risks of not changing, the benefits of changing</li> <li>- Seeks to influence outcome beliefs regarding the outcome efficacy of interventions or behavioural changes</li> <li>- Often emphasizes proximal risks and benefits over distal ones</li> <li>- Seeks to heighten self-efficacy concerning possible effective self-regulation of specific behaviours</li> <li>- May seek to elicit positive emotions, to increase optimism about the possibility of change and to heighten the salience of personal experience or other evidence supporting self-efficacy.</li> </ul>	<ul style="list-style-type: none"> <li>- Individual or group</li> <li>- Collaborative learning activities</li> <li>- Internet-based cardiac rehab education</li> <li>- Efficacious dietary interventions include case management and group interventions combined with individual counselling</li> </ul>	<ul style="list-style-type: none"> <li>- Education outcomes are considered a core component of cardiac rehab</li> <li>- Documentation of the education plan and progress.</li> </ul>
[64]	<p><b>Topics:</b></p> <ul style="list-style-type: none"> <li>- Improving cardiac risk (through a low-fat diet, blood pressure management, lipid management, smoking cessation, diabetes management, depression/stress management and physical activity habits)</li> <li>- Managing cardiac emergencies (angina, possible heart attack, pain or discomfort during exercise)</li> </ul> <p>Understanding the disease process (atherosclerosis, high blood pressure, diabetes)</p>	<p>Elderly-address impaired senses(e.g., printed instruction for hearing impaired large-type print for poor vision), offer daylight times, small amounts of information repeated often and individualized to each person, involve family/care givers to reduce social isolation, emphasize nutrition principles adapted for this age group, identify barriers to learning)</p> <p>Multicultural-plan education sessions to last longer than usual, use simple sentences when giving instruction, speak clearly and avoid technical terms, sequence the material,</p>	<ul style="list-style-type: none"> <li>- Should be dependent upon the needs and preferences of the patient and family</li> </ul>	<ul style="list-style-type: none"> <li>- Individual or group</li> <li>- Telephone, internet based, books, audiotapes, videotapes, CD-ROMs, interactive computer programs (computer assisted instruction)</li> </ul>	<p>All programs should have written plans for providing education and a method for documenting implementation and patient progress.</p>

	<ul style="list-style-type: none"> <li>- Maintaining psychosocial health (addressing sexual function, social relationships, depression, anger, hostility)</li> <li>- Adapting to limitations imposed by the disease process (changing roles in the family, jobs at work, hobbies and recreational activities)</li> </ul> <p><i>Materials should be:</i></p> <ul style="list-style-type: none"> <li>- Consistent with national guidelines</li> <li>- Developed by health care professionals</li> <li>- Developed from behaviour and education programs with documented success</li> <li>- Reviewed and commented on by patients and families</li> <li>- Approved by the appropriate institutional administrative structure</li> <li>- Dependent upon the needs and preferences of patient and families</li> <li>- At appropriate reading level of patient and family</li> <li>- Large print on nonglossy paper is more readable</li> </ul> <p>Translated into different languages</p>	<p>have patient give a return demonstration on any skill you teach, include one or more significant family members, partner with faith-based organizations whenever possible, use health care providers from the patient's culture where possible, respect the patient's health beliefs or practices</p> <p>Transplant patients-medications, symptoms, specific diet changes (diet low in fat, cholesterol and sodium to prevent weight gain and hypertension), importance of regular exercise</p> <p>Diabetes-medications, exercise safety, diet, complications, blood sugar monitoring, prevention/treatment of hypoglycemia, foot care.</p>			
[65]	<p><i>Medical topics:</i></p> <ul style="list-style-type: none"> <li>- Anatomy, physiology and pathology of cardiovascular disease</li> <li>- Coronary heart disease/ ischemic heart disease</li> <li>- Acute cardiac events</li> <li>- Investigation and procedures</li> <li>- Symptoms and their management</li> <li>- Cardiac medications</li> </ul> <p><i>Modifiable risk factors:</i></p> <ul style="list-style-type: none"> <li>- Smoking, raised lipids, nutrition and dietary fat, high blood pressure, overweight, obesity and diabetes, physical inactivity, other risk factors</li> </ul> <p><i>Non modifiable risk factors:</i></p> <ul style="list-style-type: none"> <li>- Older age, male gender, positive family history</li> </ul> <p>Behavioural and psychosocial topics:</p> <ul style="list-style-type: none"> <li>- Behaviour change and adherence to medication and advice</li> <li>- Mood and emotions</li> <li>- Psychosocial risk factors and social support</li> </ul>	<p>Low education levels, increasing age, and heightened anxiety all negatively impacts the cardiac patients' ability to learn and retain information.</p>	<ul style="list-style-type: none"> <li>- The patients' specific needs and their receptivity to information should be considered.</li> <li>- Joint setting of priorities for educational content by the patient and educator is recommended to maximize learning.</li> <li>- Information given needs to be repeated reinforced and be consistent amongst the healthcare providers.</li> </ul>	Individual or group	<ul style="list-style-type: none"> <li>- Number (%) of patients whose knowledge level is assessed.</li> <li>- Number (%) of patients with improved knowledge.</li> </ul>

	<ul style="list-style-type: none"> <li>- Impact upon the spouse and family</li> <li>- Sexual activity and activities of daily living</li> <li>- Return to work (this is considered a major aim of cardiac rehab. This is not consistently done in USA and Canada)</li> </ul>				
[66]	<p><i>Topics:</i></p> <ul style="list-style-type: none"> <li>- Attention to the common unhelpful beliefs and misconceptions about cardiac illness that lead to increased disability</li> <li>- Pathophysiology and symptoms</li> </ul> <p>Physical activity, smoking, diet, blood pressure, lipids, weight management and glucose</p> <ul style="list-style-type: none"> <li>- Psychological issues</li> <li>- Occupational issues</li> <li>- Sexual dysfunction</li> <li>- Cardioprotective drug therapy, surgical interventions and devices</li> <li>- Cardiopulmonary resuscitation</li> </ul>				
[67]	<p><i>Topics:</i></p> <ul style="list-style-type: none"> <li>- Basic anatomy and physiology of the heart, effects of heart disease, the healing process, recovery and prognosis, symptom management, medications, investigations and procedures, cardiac health beliefs and misconceptions,</li> <li>- Risk factors for heart disease and their modification for secondary prevention (e.g. smoking cessation, physical activity, healthy eating, control of blood lipids, weight, blood pressure and diabetes)</li> <li>- Supporting skill development to enable behaviour change and maintenance</li> <li>- Resumption of physical, sexual and daily living activities including driving and return to work (emphasized),</li> <li>- Psychological issues e.g. mood (depression), emotions, sleep disturbance, social factors e.g. family and personal relationships, social support/isolation</li> </ul>				
[68]	<p><i>Heart disease:</i></p> <ul style="list-style-type: none"> <li>- How the heart works, atherosclerosis, angina,</li> </ul>		- Employ adult learning principles	"Education involves more than the transfer of information. It is not	Regularly conduct process, impact and outcome evaluations

	<p>conduction disorders, valvular disease, diseases of the heart muscle, heart attack and the healing process (causes and symptoms, difference between heart attack and cardiac arrest, myths and misconceptions), cardiac symptoms and their management, what to expect during recovery</p> <p><i>Risk Factors:</i></p> <ul style="list-style-type: none"> <li>- Modifiable risk factors (smoking, raised lipids, nutrition and diet, high blood pressure, overweight and obesity, management of type 2 diabetes, physical inactivity alcohol intake, stress)</li> <li>- Non-modifiable risk factors (age, sex, diabetes, positive family history)</li> </ul> <p><i>Physical Activity/Exercise:</i></p> <ul style="list-style-type: none"> <li>- Definition of physical activity, definition of exercise, type, durations, frequency, intensity, how to monitor the level of exertion, benefits, how to manage angina while doing activity, appropriate clothing and footwear, orthopedic and musculoskeletal problem avoidance-acute and chronic, barriers to exercise, co-morbidity impact on exercise (e.g. CVA, congenital heart disease, very low level of exercise capacity)</li> </ul> <p><i>Activities of Daily Living:</i></p> <ul style="list-style-type: none"> <li>- Outline of recovery process and anticipated timeframes, general principles regarding resumption of activity, self-monitoring of exertion and symptoms, how to resume general activities using (principles of energy conservation, principles of work simplification), guidelines for return to self-care, home, work and leisure activities, use of assistive equipment</li> </ul> <p><i>Nutrition:</i></p> <ul style="list-style-type: none"> <li>- Healthy weight range, healthy eating, modification of diet to achieve appropriate body weight and maintain micronutrient adequacy, dietary fats-types, role in heart disease, salt, fibre, other nutrients in food, cholesterol, food selection/shopping, eating habits/meal patterns, food preparation/cooking, eating out/takeaway, food labelling, recipe modification, hydration during exercise</li> </ul>		<ul style="list-style-type: none"> <li>- Encourage group disclosure and sharing of experiences</li> <li>- Understand group work principles (group dynamics and participant behaviour to foster a positive learning environment for all)</li> <li>- Encourage the group to generate their own solutions to encourage ownership of knowledge</li> <li>- Use theories and strategies for behaviour change</li> <li>- Tailor the education mode to suit individual needs</li> <li>- Assess knowledge and learning style/preferences</li> <li>- Address misconceptions</li> <li>- Establish/provide a supportive learning environment</li> <li>- Address knowledge, attitude, beliefs and skills of the individual</li> <li>- Develop client-set, client-focussed learning objectives in collaboration with the health professional</li> <li>- Provide written confirmation of information provided</li> </ul>	<p>confined to formal education sessions, but is an integral component of physical activity and exercise prescriptions, counselling sessions and informal gatherings such as morning teas. Individuals can benefit from the experiences of others in similar situations so time should be allowed for group members to share their experiences either in a formal or informal way."</p>	
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	<p><i>Smoking Cessation:</i></p> <ul style="list-style-type: none"> <li>- Association of smoking and heart disease, benefits of quitting, nicotine dependence, methods of quitting (behaviour change), resources available, medications available for nicotine addiction</li> </ul> <p><i>Medications:</i></p> <ul style="list-style-type: none"> <li>- Knowledge and understanding of medications, cost, method of administration, strategies for compliance with medications</li> </ul> <p><i>Psychosocial Issues:</i></p> <ul style="list-style-type: none"> <li>- Mood and emotions (anxiety, denial, depression, grief and loss), normalization of event, address areas of concern (job security, sexual activity), psychosocial risk factors, return to normal activities, financial concerns, social support, social isolation, impact on family</li> </ul> <p><i>Stress Management:</i></p> <ul style="list-style-type: none"> <li>- Link between stress and heart disease, resources available, stress management strategies (relaxation techniques, time management, setting priorities, balancing work, family and leisure, resources available)</li> </ul> <p><i>Cardiac Investigations and Procedures:</i></p> <ul style="list-style-type: none"> <li>- Explanation of test they have had (e.g. ECG, echocardiogram, stress test, blood tests, angiogram). Explanation of management (medical or intervention) e.g. thrombolytic therapy, heart surgery, angioplasty, pacemaker implantation. Address and discuss anxieties associated with the above.</li> </ul> <p><i>CPR:</i></p> <ul style="list-style-type: none"> <li>- See heart disease topics, emergency procedures, community resources</li> </ul>				
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**Table 2:** Summary of the literature review of best practice on CR patient education. CR indicates cardiac rehabilitation; CACR: Canadian Association of Cardiac Rehabilitation; AACVPR: American Association of Cardiovascular and Pulmonary Rehabilitation; BACPR: British Association of Cardiovascular Prevention & Rehabilitation; NHFA: National Heart Foundation of Australia; ACRA: Australian Cardiac Rehabilitation Association; ACE: angiotensin-converting-enzyme; CVA: cerebrovascular accident; ECG: electrocardiogram; CPR: cardiopulmonary resuscitation.

**Patient focus group:** Focus groups are collective discussions that are designed to explore a specific set of issues. They are a qualitative technique appropriate for exploring patients' knowledge and experiences, examining not only what they think but why they hold a particular opinion. They can reveal dimensions of understanding that often remain untapped by quantitative data methods. Thus, focus

groups explore people's understanding of issues by encouraging interaction between research participants [70].

We used this approach to determine patients' experience with the education they were receiving in the CR program prior to any changes made to the curriculum. Analysis of 9 CR patients' narratives-



composing 1 focus group-identified key themes and issues about previous patient education. Using qualitative framework approach, we coded participants' narratives and grouped together under themes [70]. Main themes that emerged are described in Table 3.

Main Themes
The workbook is a valuable resource for patients.
The group setting for education delivery is an important part of the CR program. A greater number of participants could benefit from this aspect of the program if more opportunities for peer support and discussion were woven into the curriculum.
There was great value seen in the additional learning groups provided within the program including; the Eating Behaviours, Chronic Disease Self Management, Stress Management, and Post-Surgical clinic.
The importance of promoting cardiac rehab program throughout the community to increase patient access.
The CR program is holistic and customized for individuals within a group setting.
More attention to goals, including follow-up throughout rehab.
The importance of the facilitator.

**Table 3:** Main themes that emerged from patient's focus group.

### Program goals and educational objectives

Program learning outcomes are statements that reflect what learners will know and be able to do when they graduate from a program. In the development of an educational curriculum, it is important to ensure that program learning outcomes are clearly identified, which usually described what graduates of the program will

be able to do by the end of the curriculum. This aligns well with the Prescriptive Model described earlier. After the previously described activities were completed, the results enabled us to develop, in this context, our educational curriculum's 5 program learning outcomes, described in Table 4.

By the end of their 6-month CR program, patients will be able to:
Take charge of their medical condition and respond appropriately to changes in their health status;
Maintain an exercise program to improve their health and well-being;
Identify and develop strategies to improve their risk factors for heart disease;
Incorporate healthy food choices and practices to manage their health and well-being; and,
Identify and develop strategies to manage their psychosocial risks for heart disease and improve their well-being.

**Table 4:** Educational curriculum's 5 program learning outcomes. CR indicates Cardiac Rehabilitation.

Period (weeks)*	Section	Description
<b>Beginning weeks</b> (1-5)	Safety and Foundation	Information about the CR program, their aerobic exercise prescription and safety, managing angina, irregular heartbeats, diabetes, exercising in cold and hot weather, the heart (anatomy, pathophysiology, diagnoses and treatment) and cardiac medications.
<b>Middle (6-12 weeks)</b>	Skill Development	Information about the patient's risk factor profile, goal setting and action planning, resistance training, nutrition (fats, fiber, reading food labels, sodium), psychosocial risk, and sexual intimacy
<b>End (18-26 weeks)</b>	Preparing for Graduation	Information about how much physical activity is good, aerobic and resistance training progression, relapse planning, and graduation.

**Table 5:** Sections of the new educational curriculum for CR patients. CR indicates Cardiac Rehabilitation. \*The CR program is 26 weeks long.

### Sequencing instruction

Sequencing instruction is the order in which topics or objectives will be taught. The process of determining which learning must precede which other learning is called instructional analysis [20]. In summary, instructional analysis is simply a systematic procedure for sequencing instruction in order to optimize learning. To develop this educational curriculum we used a type of instructional analysis called

task analysis, which is based on the assumption that learning is hierarchical in nature, and learners should be taught from simplest to most complex topics. In addition, results from the needs assessment study described previously were important to determine in which stage of treatment patients wanted to know about a certain topic. The education curriculum developed has 3 sections, which are described in Table 5.

## Instructional strategy and design

Once the content of the course has been described in terms of expected learning and once that learning has been sequenced, the next step in the curriculum development was the instructional strategy and design, or the activities around the learner, which will facilitate his/her learning. In this context, learning activities, learning assessments, and learning resources and materials were developed.

Learning activities are designed; grouped and sequenced activities that help learners achieve the course learning outcomes. Through these learning activities learners also receive feedback about their progress and are prepared for evaluation where they can demonstrate their achievement of the course learning outcomes [22]. In the end of each lesson, learning activities are available for patients within their education workbook as well as in their group education class. Activities included practical ones like taking their pulse, cognitive ones like reflecting on their own thoughts and experiences depending on the topic and self-regulatory activities like action planning and problem solving around a desired behaviour.

Learning assessments should be aligned with learning outcomes. Thus, well-planned assessments allow learners to demonstrate that they have achieved the learning outcome or provide feedback that identified the progress they are making towards their achievement [22]. Each educational topic of the curriculum has learning self-assessments and assessments of patients' motivation and confidence level to incorporate change into their lifestyle pertaining to the topic.

Finally, when developing an educational curriculum it is important to ensure that learning resources and materials support the learning activities and assessments. They also need to align with the needs, interests and abilities of the learners [22]. In this context, the resources and materials of our cardiac patient and family education curriculum are:

- 24 educational weekly group education sessions strategically mapped and sequenced to support the program learning outcomes. Education sessions are facilitated by an inter-professional team of CR experts and are usually 30 minutes in duration. These sessions use peer support, sharing of experiences, problem solving, and are interactive.
- A comprehensive education workbook for people living & thriving with cardiovascular disease containing 22 chapters, developed by a multi-disciplinary committee of 16 CR and patient education experts (see appendix 1 for table of contents). Clinicians and patients reviewed the material and a plain language and clear design review was completed. The workbook's chapters were mapped to correspond to the three topics of the educational curriculum described in Table 5.

## Instructional methods and materials

**Instructional methods:** For this educational curriculum a combination of four teaching methods were used: (1) instructor-centered, (2) interactive, (3) individualized techniques, and (4) experiential learning.

Although in this educational curriculum education sessions are included in each CR session, instead of learners being passive receivers of information, interactive methods are used to promote communication among learners, as well as between learners and the instructor (e.g. class discussion, peer-to-peer learning and discussion groups). Individualized learning techniques are also included in the

educational curriculum, based on the assumptions that individuals learn at different speeds and that regular immediate feedback facilitates the learning process [20]. In this context, patients have the opportunity to have a one-on-one consultation with health providers, including a dietitian, a social worker and a psychologist. Finally, experiential learning methods-learners performing tasks-are also used in this curriculum, such as creating action plans to support self-management.

**Instructional materials:** Instructional materials are the tools used by the instructor to help the learner retain, compare, visualize and reinforce learning [71]. As described elsewhere, the materials of our educational curriculum are an education workbook and educational weekly lectures. Both resources were strategically mapped and sequenced to support the program learning outcomes. While the workbook comprises the full comprehensive explanation, the weekly education sessions highlight the important ideas of each topic, as well as check patients' progress (assessments). Besides that, there are individual care plans, in which patients can interact with staff while they are exercising. In the future this educational curriculum will be multicultural (to ensure that information is understood by patients from different cultures) and multimedia (internet and mobile resources in order to achieve a broader group of patients, in different countries).

## Evaluating instruction and materials

**Evaluating instruction:** Capacity building involves increasing knowledge, skills and resources of existing structures to disseminate an idea [72]. In the development of our educational curriculum, each instructor participated in building capacity sessions, which involved information about the new curriculum, including learning activities, assessments and outcomes in order to enhance instructors' skills essential to implementation of the new educational curriculum. Here, instructors met in small groups of 4-6 on a weekly basis over a course of 6 months. They had the opportunity to learn the new curriculum and the skills for group facilitation that to support self-management. They also expressed their learning needs and used the time to support one another during this implementation phase. Our experience indicates that building capacity sessions are a viable method for instruction assessment, since an informal feedback is provided to instructor about their instruction. It also offers an ideal environment for shifting culture change in how education can be delivered to support behaviour change.

**Evaluating materials:** Three groups evaluated the new education workbook: patients, staff, and experts. In regards to patients' feedback, 8 focus groups (total of 24 patients and 1 spouse) were held. Sessions were 45 minutes long and a 21-item discussion guide was developed by the PEC to guide the discussion. Positive features of the workbook identified by patients included: content covers their needs, appropriate amount of information, and appropriate language and content. Negative features included binding and weight. Overall, patients were very satisfied with the workbook.

Staff's feedback was also collected during a focus group (n=10), and 13-item discussion guide was developed by the PEC to guide the discussion. Staff identified that the workbook promotes a better interaction with patients, and that it is a good resource for them too. However, they point out that finding information is not always easy.

Finally, experts (editors, volunteers, patients with a medical or educational background) assessed the content and outcomes of the

workbook. Results were positive and reinforced the use of this tool to educate patients.

**Evaluating learning for health outcomes:** A study was performed to investigate changes in knowledge and HAPA constructs among CR patients exposed to the new education curriculum [73]. One hundred and forty-six patients consented to participate in this study and results showed that there was a significant improvement in patients' knowledge from pre- to post-CR, as well as some HAPA constructs and exercise behaviour [73].

## Discussion

This study described the phases of the development of an educational curriculum for CR patients and its assessment. This new curriculum consisted of 24 educational weekly lectures strategically mapped and sequenced to support the program learning outcomes and an educational workbook with 22 chapters matching the weekly lectures. Individual care plans were also provided. Each educational topic provides background educational content, learning activities, learning assessments, behavioural-based action planning related to the topic, and assessment of patients' motivation and confidence level to incorporate change into their lifestyle pertaining to the educational topic. Positive aspects of the educational curriculum include the following: topics structured from simplest to most complex; instructional strategy and design comprising learning activities, learning assessments and learning resources and materials; all 4 categories of teaching methods included (instructor-centred, interactive, individualized techniques and experiential learning); capacity building sessions to increase knowledge, skills and resources of instructors as well as to assess them; and evaluation of the materials by multiple groups (patients, staff, and experts). The content was also reflective of what patients told us was most important to learn. There was also evidence that this education intervention was effective to improve knowledge, change theory-implied constructs of behaviour and enhance physical exercise in CR patients.

A key strength of this study is the empirically derived, conceptually congruent intervention. Our educational intervention was developed on the principles of the following theories: constructivist learning theory, the HAPA model, adult learning theory and prescriptive model. In addition, because CAD is considered a chronic condition, the intervention was designed to promote self-management, which is an important element for the management of chronic disease as described elsewhere. Reviews of effectiveness of chronic disease management interventions indicate that interventions based on behavioural change models are more likely to be effective than those that are not [74].

Strength in this study was the needs analysis. The information gathered from the five activities described earlier allowed us to develop a vision for a patient and family education curriculum and five program learning outcomes. These activities were very comprehensive including information derived from patients (assessment of patient information needs and patient focus group), health providers (staff survey of patient information needs), other CR programs (environmental scan of other CR programs), and national guidelines (literature review of best practice). Synthesizing the information gathered from the needs analysis allowed us to develop a vision for a patient and family education curriculum that includes: a variety of topics and modes of delivery that are relevant to CR patients; information that help CR patients to make informed decisions about

their health; and information that is also consistent across the team members and is supported by best evidence. In addition, based on results from this phase the new curriculum is sensitive to potential barriers to learning, culture specific for both patients and staff, and specialized for special populations.

One of the greatest challenges of delivering educational interventions to cardiac patients is to integrate multiple characteristics and cultures into clinical practice. In the future, the educational workbook will be translated to different languages that will also be reflective of culture. We will also build a multimedia set, so patients can assess information in their mobile and at home. Whether a software version of the curriculum would have similar efficacy in delivering the message is unknown, but is worth investigated.

Caution is warranted when interpreting these results. The chief limitation is assessment of clinical efficacy. As described elsewhere, a study investigating changes in knowledge, HAPA constructs and exercise behaviour among CR patients exposed to the new education curriculum was performed; however, the clinical efficacy (e.g. changes in mortality/morbidity, adherence to medical regimen, prevention of complications, decrease of hospitalizations) was not assessed and should be examined in a future study. Second, this study was specific to a cardiac rehab program in Ontario, Canada and the effectiveness of this program may be generalizable to patients attending programs in this region. Future studies should integrate multiple characteristics and cultures into clinical practice, adapting this curriculum to other realities.

## Conclusion

The educational curriculum developed in this study is a sequential and theoretical strategy that has the potential to reach other CR programs in order to support cardiac patients' education and behaviour change.

## Practice implications

Educational interventions are needed to cardiac patients not only to increase knowledge but also enhance intentions, self-efficacy, and action planning. This included the provision of education and skill training for CVD prevention based on a better understanding of the individuals' social and cultural characteristics.

The educational intervention developed showed as a powerful tool to promote behaviour change in CR patients. CR programs can use the process described in this study to develop their own educational components.

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