

AMERICAN UNIVERSITY OF BEIRUT

CARDIAC REHABILITATION AT AUBMC: CLINICAL
PROTOCOLS AND THE ROLE OF THE ADVANCED
PRACTICE NURSE

by
MOHAMAD MAHMOUD ISSA

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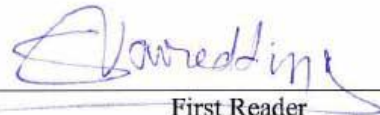
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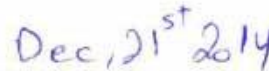
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AN ABSTRACT OF THE PROJECT OF

Mohamad Mahmoud Issa for Master of Science
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Title: Cardiac Rehabilitation at AUBMC: Clinical Protocols and the Role of the Advanced Practice Nurse

Coronary artery disease and heart failure are the two most common cardiac diseases, mandate changes in lifestyle, mainly diet, exercise, smoking cessation, in addition to taking prescribed medications in order to prevent recurrent exacerbations and to reduce cardiovascular risk. Cardiac rehabilitation programs provide the infrastructure that allows cardiac patients to change unhealthy behavior and improve their functional capacity.

The history of cardiac rehabilitation started in the late 60s, since then cardiac rehabilitation is being delivered mainly by three international models: American, British, and Australian model. The evidences has shown many beneficial effects on the outcome of cardiovascular diseases patients including: reducing the risk of a future cardiac events by stabilizing, slowing, or even reversing the progression of cardiovascular diseases; improving the clinical outcomes of patients with various cardiovascular diseases; and significantly reducing the cardiovascular mortality, and hospital readmission.

The aim of this project is to develop the clinical protocols and documentation forms of the cardiac rehabilitation program at American University of Beirut Medical Center (AUBMC), with an emphasis on the role of the advanced practice nurse. The proposed cardiac rehabilitation program is adapted from the three international cardiac rehabilitation models and aligned with latest guidelines of managing the risk factors of the cardiovascular diseases. The proposed cardiac rehabilitation program for AUBMC follows a clinical pathway consisting of six stages, which starts with patient presentation, then assessment and enrolling of the patient in the program, then the patient goes into in-hospital cardiac rehabilitation, after the discharge from the hospital, the patients are enrolled in out-patient rehabilitation program, the patients then are assessed at the end program, and discharged to a follow-up phase.

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INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death in the world (Mathers et al, 2001; WHO 2002). One third of global deaths are due to Coronary Artery Diseases (CAD) and related complications (Lebanese Society of Cardiology and Cardiac Surgery [LSCARDIO], 2012). In Lebanon, CVD accounts for 45% of all deaths (World Health Organization [WHO], 2010) and for 60% in older adults (LSCARDIO, 2012).

Survivors of CV events such as myocardial infarction, and patients, who underwent coronary revascularization, often leave the hospital with impairment in their functional capacity; they are often frightened, depressed, or still symptomatic, and therefore unable or unwilling to go back and resume an active lifestyle. Significant advances in CV medicine and rehabilitation have provided the means to restore and improve patients' functional capacity and modify their risk factors, which subsequently have shown significant reduction in the risk of recurrent CV events, hospitalizations, and deaths (Taylor et al., 2014). In tandem with medical therapy, many cardiovascular risk factors can be controlled by implementing changes in patients' life style; such modifiable risk factors include: 1) physical inactivity; 2) smoking; 3) obesity; and 4) poor dietary habits. Physical inactivity, for example, is a major predictor of morbidity and mortality particularly in the Lebanese population, where half of the patients are reported to be inactive (WHO, 2008).

Advising patients to do life style modification is not enough; patients need to be provided with an infrastructure that helps them change unhealthy behaviors and practices. This fact led to the development of comprehensive cardiac rehabilitation

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programs that provide such structure and facilitate the patients' gradual healthy return to their function. The Cardiac Rehabilitation Working Group of the European Society of Cardiology has defined cardiac rehabilitation as "The sum of interventions required to ensure the best physical, psychological and social conditions so that patients with chronic or post-acute cardiac disease may, by their own efforts, preserve or assume their proper place in society" (Goble a & Worcester, 1999, page 10).

Cardiac rehabilitation includes four main phases according to the American Heart Association (AHA) and the American College of Cardiology (ACC): 1) in-patient phase; 2) Early ambulatory out-patient phase; 3) Late ambulatory out-patient phase and 4) maintenance phase. The in-patient phase begins in the hospital just after the diagnosis and management of a cardiac event (myocardial infarction, unstable angina, revascularization, cardiac surgery). This phase includes early ambulation and education, which are usually tailored to each patient's needs. The out-patient phase is a supervised outpatient ambulatory program of at least 40 sessions directed to patients in the convalescence period. Patients start to attend the cardiac rehabilitation center in the few weeks after their hospital discharge, and undergo supervised exercise training with gradual increase in intensity, along with counseling and teaching. A long life maintenance stage then follows where the patients are ready to pursue similar active lifestyle on their own. The maintenance phase may include regular recall and review by physician or advanced practice nurse (APN) (Woods, 2004).

According to the British Association for Cardiovascular Prevention and Rehabilitation (BACPR) and the National Institute for Health and Clinical Excellence (NICE), cardiac rehabilitation shall be delivered in a clinical pathway consisting of seven stages starting with identifying patients eligible for enrollment into the program

till long term management. This model is described in detail in the literature review section.

Significance

Cardiac rehabilitation was shown to improve the clinical outcomes of patients with various cardiac illnesses, such as CAD and heart failure. A Cochrane review of 47 randomized controlled trials (RCTS) of 10,794 patients with myocardial infarction (MI), coronary artery bypass graft (CABG), or percutaneous trans-luminal coronary angioplasty (PTCA) examined the effect of exercise based cardiac rehabilitation on mortality, morbidity and health related quality of life. Participation in cardiac rehabilitation was found to significantly reduce total mortality beyond one year (RR = 0.87, 95% confidence interval [CI] = 0.75, 0.99), cardiovascular mortality (RR = 0.74, CI=0.63, 0.87), and hospital readmission up to 12 months (RR= 0.69, CI=0.51, 0.93) but it did not reduce the risk of MI, CABG, or PTCA (Heran et al., 2011).

A Cochrane review of 33 RCTs that included 4,740 participants with heart failure by Taylor and colleagues (2014) found that patients with heart failure who were enrolled in cardiac rehabilitation program had reduced risk of overall hospitalizations (RR 0.75; 95% CI 0.62 to 0.92) and hospitalizations due to heart failure (RR 0.61; 95% CI 0.46 to 0.80), and improved quality of life (mean difference: -5.8 points; 95% CI -9.2 to -2.4). There was no evidence of harm or death associated with participation in rehabilitation among the patients studied. Concerning mortality, there was no evidence of decrease or increase mortality on the short term with < 12 months of follow up; on the other hand, there was a trend for lower mortality associated with cardiac rehabilitation for heart failure patients on the long run, i.e. studies with > 12 months follow up (Taylor et al., 2014).

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In Lebanon, we lack cardiac rehabilitation programs that help patients to adhere to life style recommendations. The infrastructure that allows cardiac survivors to benefit is an out-patient cardiac rehabilitation program, which is planned to be initiated at AUBMC. Given the lack of public awareness of the benefit and the need for such program in our region we felt the need to do a well-organized community- sensitive protocol that can meet our patients' needs, and where the advanced practice nurse can play a key role. The aim of the project is to develop the clinical protocols and documentation forms of the cardiac rehabilitation program at our institution with an emphasis on the role of advanced practice nurses.

LITERATURE REVIEW

The nature of care following acute cardiac events has undergone many changes historically. In 1772, Heberden published a paper describing an activity program designed to one of his patients who suffered from chest pain. His activity program consisted of 30 minutes daily exercise for six months. Twenty years later in 1799; Parry noted that physical activity is beneficial for patients with chest pain. However in 1912, Henrich initially described the disorder “myocardial infarction” (MI) and mentioned his concern about the necessity of rest in those patients, since physical activity can increase the risk of ventricle aneurysm and raise arterial blood pressure, especially in the 6 to 8 weeks post infarcts. Again in 1930, the need for physical inactivity was reinforced again by Mallory and White, who advised bed rest for patients with even small MI for a minimum of three weeks (Certo, 1985).

In the late 1930s the New York State Employment Service (NYSES) raised the issue of the increase in number of retired workers due to MI, then in 1940 the NYSES asked the New York Heart Association (NYHA) to inspect their workers who had heart disease to know what the safety level of their physical activity was. Thus the NYHA started cardiac work evaluation units in large hospitals aiming to: provide comprehensive clinical cardiac check-up of workers with cardiac diseases for appropriate job placement, which served also as educational unit for the community and as a research unit that evaluated the relationship between physical activity and heart disease. In 1952, Levin and Lown re-questioned the need for activity restriction for patients following MI and concluded that prolonged rest after MI may cause a decrease in functional capacity, depression, and increased rate of complications. In the thirteenth medical session at the AHA, Turelle and Hellerstein recommended a graded physical

activity program for cardiac patients, and recommended to do clinical research on this issue (Certo, 1985).

In the 1960s many researchers concluded beneficial effect of physical activity following cardiac events. In the late 60s, an inpatient program consisting of supervised physical activity for patients in the acute phase post recovery of MI was started. This program consisted of 14 stages of activity and included three main dimensions: physical activity, activity of daily living and an education program. This program was shown to assist patients to be discharged home and return to their normal active life. Later Hellerstein and colleagues developed a physical activity program for their patients after hospital discharge and based their work on the favorable outcome of their prior inpatient activity program. They studied 200 patients post MI, and concluded that outpatient cardiac rehabilitation can benefit patients physiologically and psychologically without causing an increase in their mortality and morbidity (Certo, 1985). Since then, many cardiac rehabilitation models were developed in North America, Europe, and Australia, and many studies were conducted to assess the impact of cardiac rehabilitation programs on heart disease, increase the uptake and adherence of the patients to the cardiac rehabilitation programs, and to study the adequacy and efficacy of specific cardiac rehabilitation program components.

Models of Cardiac Rehabilitation

The era of cardiac rehabilitation started at the late 60s; since then, cardiac rehabilitation is being delivered mostly in three models: The American model, British model, and Australian model. Other countries either use one of these models or some adaptation of it.

American Model of Cardiac Rehabilitation

In the United States the guidelines of cardiac rehabilitation were released jointly by the AHA and American College of Cardiology (ACC), most recently in 2007 (Balady et al., 2007). The American model divides cardiac rehabilitation into four phases. The care within those phases must acknowledge the core components of cardiac rehabilitation. Phase one is the in-hospital rehabilitation phase. In this phase, the Advanced Practice Nurse visits the patient in the hospital, assists him/her in early ambulation, introduces the service, clarifies any misconceptions and fills the assessment and referral sheet. Phase two is the early out-patient monitored cardiac rehabilitation. Phase two starts two weeks after discharge from the hospital and is done over 20 sessions, three sessions per week. Phase three is the late out-patient unmonitored cardiac rehabilitation. The patient in phase III attends also 20 sessions, three sessions per week. Phase four is the maintenance phase or home based cardiac rehabilitation. In phase IV, nurses do frequent follow up calls, and patients come to the clinic to be seen by their cardiologist or the cardiac rehabilitation medical director on regular intervals.

Core components of Cardiac Rehabilitation

Cardiac rehabilitation programs include specific core components that focus on risk reduction, nurturing compliance with healthy behaviors, alleviation of disabilities, and encouragement of an active lifestyle in cardiac patients. The core components follow a process that mimics the nursing process: Assessment, interventions, and expected outcomes for each component. The core components include: 1) baseline patient assessment; 2) nutritional referral; 3) management of risk factors (dyslipidemia, hypertension, obesity, diabetes mellitus, and smoking); 4) psychosocial treatment and support; and 5) exercise training. The advanced practice nurse's role is to make sure that

the care delivered in cardiac rehabilitation is aligned with these components (Balady et al., 2007).

Baseline assessment

The nurse assesses for pertinent cardiac comorbidities, procedures, and operations, including devices such as Left Ventricle Assisting Device (LVAD), Cardiac Resynchronization Therapy and Defibrillator device (CRTD). Other comorbidities such as Diabetes Mellitus (DM), depression, and musculoskeletal diseases, as well as medications, and influenza vaccination status are also investigated. Moreover, physical assessment of cardiovascular and pulmonary function is done, in addition to obtaining a 12-lead ECG. The assessment findings are documented, and the treatment and follow-up plan are discussed with the patient's primary health care provider. The APN ensures that the patient takes adequate doses of aspirin, Clopidogrel, Beta blockers (BB), statins, and angiotensin converting enzyme inhibitor (ACEI). Patients are evaluated in terms of reaching short term treatment targets, adherence with medications' prescription, and a discharge plan that includes long term goals (Balady et al., 2007).

Nutritionist counseling

The dietitian assesses the caloric requirements and eating habits, including intake of fibers, polyunsaturated fats, salt, and alcohol consumption. Patient's weight is measured and the presence of hypertension, diabetes and heart failure is noted. Next, the required diet is provided and behavioral changes and compliance strategies are addressed. Expected outcomes include the patients' achieving a well-balanced diet and verbalizing their understanding of the contents of a correct diet. In case of a need for weight reduction, the patient's height, weight, and waist circumference are obtained and

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body mass index (BMI) documented. Then a plan for reasonable weight reducing strategy and plan for walking 1 to 1.5 hours per day is made. Expected outcomes include continuing assessment until weight control, and long term adoption of a healthy diet & achieves BMI of 25 (Balady et al., 2007).

Management of risk factors

For hypertensive patients, blood pressure is taken on two visits from both upper limbs. Assessment of orthostatic hypotension, current treatment and compliance is made, in addition to review of all medications taken by the patients for their effects on blood pressure. The primary physician is consulted for initiating or reviewing antihypertensive therapy. The expected outcomes include achievement and maintenance of the target BP (Balady et al., 2007).

For lipid management, a lipid profile is obtained and patients screened for dietary ingredients or medications that may affect their cholesterol levels. A dietitian is consulted for proper diet and prescription of antilipid medications is done as needed (Balady et al., 2007).

Patients known to have diabetes are screened for potential complications, such as problems with the eyes, or kidneys and for hyperglycemia or hypoglycemia episodes. Baseline fasting blood sugar (FBS) and glycosylated hemoglobin are obtained. The patient is educated about signs and symptoms of hyper/hypoglycemia. If the patient is on insulin, precautions related to meals and exercises are provided, in addition to education about the management of hypoglycemia (Balady et al., 2007).

For patients who smoke, smoking habits and readiness to quitting smoking are assessed at each visit, in addition to related psychosocial factors. For patients who are not ready to quit, brief motivational interventions are provided. Once the patient is

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ready then he/she is encouraged to set a quit date. Education materials and social support are provided. Moreover if available, more intense counseling and nicotine replacement therapy are provided. The expected outcomes include smoking cessation and prevention of exposure to second hand smoking (Balady et al., 2007).

Psychosocial management

Patients are screened for depression using a standardized measurement tool, in addition to anxiety assessment and use of psychotropic medications if needed. Patients are educated on how to adapt to the disease and self-help strategies. Referral to psychiatry is made as needed. Expected outcomes include the absence of clinically significant anxiety and depression, and intact psychological behavior (Balady et al., 2007).

Exercise Training

A major component of cardiac rehabilitation is exercise training. Patients are assessed for symptoms that lead to exercise impedance. Vital signs are assessed during exercise, and ischemic changes noted, then exercises are tailored to the patient's condition. An exercise plan is developed that includes aerobic exercises according to the last assessment, comorbidities, and patient expectation. The level of exercise is designed and approved by the preventive cardiologist; the order of training includes frequency (F), intensity (I), duration (D), modalities (M), and progression (P). Patients start with warm up, and end with cool down for each session. Updates on tolerance are provided and adjustments made accordingly. Expected outcomes are: Patient is able to recognize red flags; has less stress and better exercise tolerance; as well as marked reduction in risk factors (Balady et al., 2007).

British Cardiac Rehabilitation Model

The British cardiac rehabilitation model follows the BACPR guidelines that were edited in 2012 and the NICE guidelines that were edited in November 2013. The BACPR has set seven standards and seven core components for cardiac rehabilitation and preventive cardiovascular services. The seven stages of the clinical pathway of care include stage 0: patient presentation, stage 1: identification for eligibility, stage 2: referral, stage 3: assessment and developing a plan of care, stage 4: delivery of the program, stage 5: final assessment and discharge, and stage 6: long term management. The pathway is shown in figure 1 below

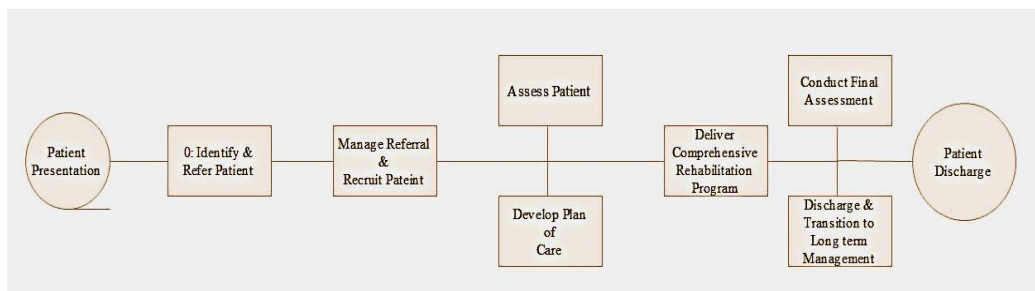


Figure1: BACPR clinical pathway, reproduced from (BACPR, 2012)

The first BACPR standard mandates delivery of evidence based care. The second standard outlines the multidisciplinary team that provides the care and that includes an expert clinician who holds the responsibility of coordinating the center. The team members include a cardiologist, a nurse specialist, a physiotherapist, a dietitian, a psychologist, an exercise specialist, an occupational therapist and a clerical administrator. The third standard identifies patient inclusion criteria, which are: Acute coronary syndrome (ACS); patients who underwent revascularization; stable heart failure; stable angina; patients who underwent AICD or CRTD insertion; patients who underwent heart valve repair/replacement; patients after heart transplantation or LVAD

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insertion; patients with grown up congenital heart disease; patients with transient ischemic attack or peripheral vascular disease; and patients with high risk ASCVD. Referral shall be discussed with all eligible patients and initiated from a member of cardiac rehabilitation team before discharge (BACPR, 2012).

Standard four addresses patient assessment, which is initiated within two weeks of discharge and includes the full assessment of risk factors, psychological health, and usage of medication, in addition to the assessment of physical, social, behavioral, or psychological impact of changing life style, as well as the plan of goal setting with a written plan of care. Patients shall also receive on-going assessment throughout the stages of the cardiac rehabilitation process. Standard five states that a defined clinical pathway shall be implemented on all patients and be aligned with patients' preference and clinical condition. Standard six mandates that data about uptake shall be submitted to the National Audit for Cardiac Rehabilitation (NACR). Standard seven addresses the business aspect so that every cardiac rehabilitation service shall be based on national funding agencies and 3rd party payers and the program adequately funded (BACPR, 2012). The core components are described next.

The first core component includes education and change of unhealthy behaviors. Education shall be individually tailored according to patient's diseases and interest. Education programs may include pathophysiology and symptoms; physical activity; smoking; weight reduction; hypertension, dyslipidemia, and diabetes; sexual dysfunction; medications and procedures for cardiac diseases; and basic life support. To help patients transition to a healthy behavior, the cardiac rehabilitation staff shall be educated about therapeutic communication and motivational interviewing skills. The

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delivered information shall include components that improve uptake and adherence. The staff shall clear misconceptions about cardiac rehabilitation.

The second component addresses lifestyle risk factor management as in the American Model of Cardiac Rehabilitation, including physical activity, diet, and smoking cessation. The third component addresses psychosocial health. The fourth component includes management of medical risk factors including blood pressure, dyslipidemia and diabetes. The fifth component addresses cardio-protective therapies, including medications (anti-platelets, statins, beta blockers, ACE inhibitors/ Angiotensin Receptors Blockers (ARBs), CCBs, anticoagulants and diuretics) and implantable devices including CRTD or AICD. The sixth component addresses long-term management. By the end of the cardiac rehabilitation program, the patients shall identify their long term goal, and develop their own self-management skills. Patients shall join a social support group and smoking cessation program. The seventh core component deals with audit and evaluation of quality using outcomes and performance indicators that are benchmarked with local, regional and national standards (BACPR, 2012).

Finally, the optimal time to start cardiac rehabilitation was identified in the NICE guidelines. For patients with MI, in-patient cardiac rehabilitation shall be started directly after admission. The out-patient cardiac rehabilitation program shall be started ten days after discharge. For treated unstable angina (UA) or non-ST-segment-elevation myocardial infarction (NSTEMI), in-patient cardiac rehabilitation shall start directly after admission and outpatient rehabilitation two weeks after discharge if treated by angioplasty. For patients following CABG, education shall start before surgery, physical activity shall be started after surgery. Out-hospital rehabilitation shall be started six

weeks after surgery. For stable congestive heart failure, rehabilitation starts in the hospital and is continued just after discharge (NICE, 2013).

Australian model of cardiac rehabilitation

Cardiac rehabilitation in Australia is delivered according to the National Heart Foundation of Australia (NHFA) and the Australian Cardiac Rehabilitation Association (ACRA) guidelines. The initial guidelines were released in 1998 then were updated in 2004. Cardiac rehabilitation follows a continuum that starts as in-patient rehabilitation, then out-patient rehabilitation program, then finally as an ongoing preventive approach. A multidisciplinary approach is preferable, with the center led by a coordinator who is expert in cardiac rehabilitation. The team shall include a trained health professional who holds a degree in medicine, nursing, physical therapy, occupational therapy, or dietetics. In-addition, a staff member who is specialist in providing education for adults is required. In brief, the cardiac rehabilitation model in Australia requires three staff members: a coordinator, who is expert in the field; a health professional trained in cardiac rehabilitation; and an expert in adult patient education.

The inpatient cardiac rehabilitation starts directly after admission and includes in-patient ambulation and education. The in-patient program emphasizes on: Basic information about disease and management; guidelines for activity; discharge planning; and referral to the outpatient cardiac rehabilitation program. The Out-patient cardiac rehabilitation starts just after hospital discharge and continues to be a life-long prevention program. The main components of the Australian model of cardiac rehabilitation are the same as those of the British and American models, starting with a comprehensive patient assessment, and including exercise, education and

behavioral change training, risk factor management, as well as cardiac investigations and procedures (NHFA & ACRA, 2004).

Psychological interventions in cardiac rehabilitation

As described in chapter I, investigators studied the outcomes of cardiac rehabilitation programs. Cardiac rehabilitation was found to enhance functional capacity and cardiovascular health, reduce development of further coronary artery disease, and improve psychological wellbeing (Lewin, 1992). In addition, specific rehabilitation interventions were assessed. A Cochrane review examined 24 clinical trials of psychological interventions used in cardiac rehabilitation programs for coronary artery disease patients (Whaley et al., 2011). There was no evidence that psychological interventions reduced the risks of mortality, future percutaneous intervention (PCI), CABG or MI. Nonetheless, the psychological interventions resulted in small to a moderate decrease in depression, with a standardized mean difference of -0.21 (95% CI -0.35, -0.08). There were four interventions mentioned in this review. The most effective intervention was “treating type-A behaviors”; the other three interventions were less effective, including education of cardiac patients about risk factors, patient-directed discussion and emotional support, and including family members in psychological interventions (Whaley et al., 2011).

Application of Bandura’s self-efficacy theory in cardiac rehabilitation

Many cardiac rehabilitation programs lack a theoretical framework to guide their interventions (Jeng & Braun, 1994). Interventions are delivered without taking into account human complexity, or the challenges of changing unhealthy behaviors. The most commonly used theory for addressing behavior change is Bandura’s self-efficacy theory, which is used as a framework for predicting healthy behaviors, such as smoking

cessation, exercise, and weight reduction and has strong empirical support in influencing these behaviors (Glanz, Rimer, & Lewis, 2002). Self-efficacy is defined by Bandura as one's belief in his/her ability to succeed in specific situations (Bandura, 1997). The Self-efficacy theory is derived from social cognitive theory, which proposes that behaviors, personal factors, and cognition indirectly elicit human behaviors. According to the self-efficacy theory, people's views about their own capacities predict their future behaviors (Glanz, Rimer, & Lewis, 2002).

Self-efficacy has two types of expectations: efficacy expectation, which is the perceived ability to perform the actions and the effort involved; and outcome expectation, which is the belief that an outcome will be achieved as a result of a specific behavior. There is no clear evidence that change in behavior is related to outcome expectation, unlike efficacy expectation that was shown to predict behavior change. Efficacy expectation is affected by: behavioral performance, vicarious experience, verbal persuasion, and physiological feedback. Previous successful experience can lead to better expectations of success in enacting the change in behavior in question. Vicarious experience affects personal expectation by comparing or contrasting oneself with the experience of others. Verbal persuasion is the influence of others' suggestion on own expectation. Physiological feedback includes manifestations that arise from enacting the behavior change, such as arousal, fatigue, discomfort or pain. An example would be withdrawal symptoms that people attempting smoking cessation experience. The figure below displays the self-efficacy model proposed by Bandura (1997).

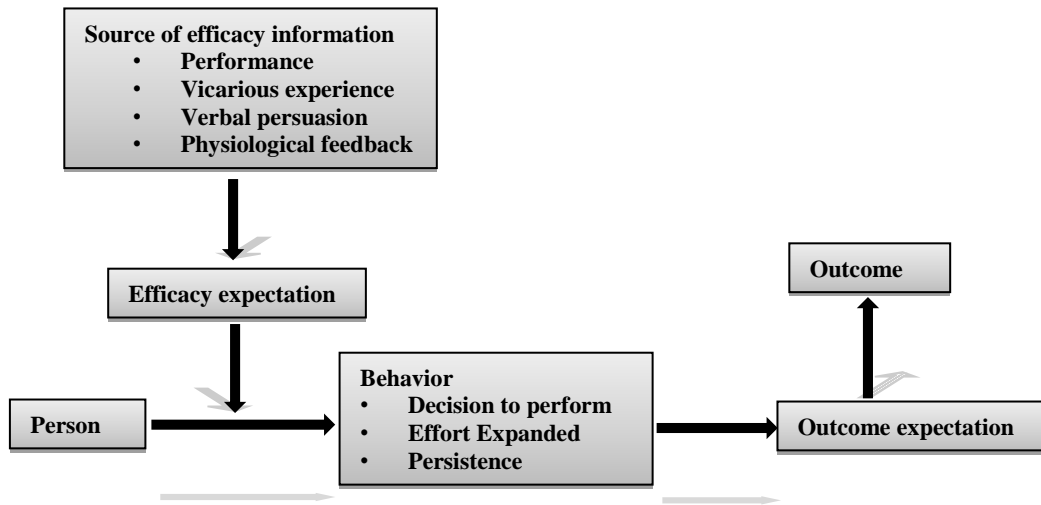


Figure 2: Self-efficacy model, reproduced from Bandura 1997

Many studies examined the relationship between efficacy expectation and physical activity. Self-efficacy to perform moderate activities of daily living at discharge was a predictor of physical activity after six months in CABG patients (Allen et al., 1990). In another study, self-efficacy scores after exercise were found to be better predictors of the intensity and duration of exercise than the peak exercise heart rate in patients three weeks after myocardial infarction. Moreover, the patients were able to judge their ability to perform the activities even before the performance of exercise (Ewart et al., 1983). Finally, self-efficacy was found to be significantly related to biological responses of exercise. That is, patients with high self-efficacy scores had longer time to reach maximal heart rate compared to those with lower self-efficacy (McAuley et al., 1991).

Based on the above studies, and in order to apply Bandura's theory to enhance self-efficacy of patients in cardiac rehabilitation programs, certain related practices were implemented. For instance, during the in-hospital phase of cardiac rehabilitation, self-

efficacy was addressed during exercise training, education program, informal discussion by the cardiac rehabilitation nurse and physician, and telephone follow-up calls. Patients who participated in phase I cardiac rehabilitation had improved self-efficacy of performing activity of daily living more than patients who did not enroll in phase I cardiac rehabilitation (Gulanick, 1991). Phase I cardiac rehabilitation followed by telephone contact was found to enhance self-efficacy for exercise in the convalescence period, as shown in an experimental study that used education during hospital stay followed by telephone conversation in 81 patients who underwent CABG (Gillis et al., 1993).

Bandura's self-efficacy theory can be used as a framework for health care providers who provide care for patients in cardiac rehabilitation. This theory helps them assess, predict and modify health related behaviors and explore ways to enhance self-efficacy such as having a patient who had a successful course of cardiac rehabilitation present for patients the benefits of the program, utilize group discussion, verbal reassurance during exercise, and having loved ones of the patients provide psychological support (Jeng & Braun, 1994).

Promoting patients' Attendance of Cardiac Rehabilitation

One final aspect worth mentioning is the adherence (or lack thereof) to cardiac rehabilitation programs. Cardiac rehabilitation aims to hasten recovery from cardiac illness and prevent complications and recurrent coronary events (Jolliffe, 2001; Taylor, 2004). Despite the benefits of cardiac rehabilitation, not all candidates participate in these programs. A systematic review focused on ten studies that tested interventions that aim to promote patients' enrollment and adherence to cardiac rehabilitation (Davies et al., 2010). The authors concluded that three interventions were effective in promoting

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the uptake of patients into cardiac rehabilitation programs. These were: 1) Motivational letters based on the Theory of Planned Behavior; 2) Social worker visit during hospitalization; and 3) telephone calls four weeks after discharge. Nurses filled record cards to provide patients with prompt follow up. The authors also concluded that seven interventions were effective in promoting adherence to the rehabilitation programs. These were: 1) Goal setting and action planning; 2) self-monitoring of exercise and daily activities; 3) problem-solving and coping strategies; 4) written and oral commitment of weight reduction and smoking cessation; 5) stress management; 6) persuasive written and telephone communication; and 7) small group interaction and peer modeling

Based on the above review, cardiac rehabilitation is a complex undertaking, requiring the concerted efforts of a multidisciplinary team, with each member bringing in his/her expertise to provide holistic care to patients. The program ought to be initiated while the patient is in the hospital, and continued on an outside basis, with gradual weaning till the patient is on his/her own. Patient/family involvement in setting goals of care and promotion of the patient's self-efficacy ensure healthy behavior changes. Follow up contacts seem to ensure maintenance of long term outcomes.

THE PROPOSED CARDIAC REHABILITATION PROGRAM FOR AUBMC

The proposed AUBMC model of cardiac rehabilitation is adapted from AHA, ACC, BACPR, and the NICE guidelines of cardiac rehabilitation. The model is also aligned with the latest guidelines for the management of hypertension, dyslipidemia, and diabetes that were released by the Joint National Committee (JNC 8) in 2014, Adult Treatment Panel (ATP IV) in 2013, and the American Diabetes Association (ADA) in 2014. The model takes into consideration the Lebanese culture, the limited resources including limited financial coverage, and the limited number of health care professionals dedicated to cardiac rehabilitation including social workers, psychologists, and occupational therapists.

The model uses Bandura's self-efficacy theory as a framework in order to help the staff assess the patient's ability to adhere to the prescribed changes, and optimize the patients' implementation of the changes in their life style. The goals of this cardiac rehabilitation model are to: 1) help enrolled cardiac patients establish and adhere to an individualized plan that encourages reduction of modifiable cardiac risk factors (hypertension, dyslipidemia, diabetes, smoking, and obesity), 2) help patients apply self-care, 3) improve the patients' ability to perform mild to moderate intensity physical exercises, and 4) to relieve anxiety and depression associated with the negative effects of cardiovascular diseases.

Description of the model and the Multidisciplinary Team

Out-patient Cardiac rehabilitation center

The cardiac rehabilitation center shall consist of a large exercise room, a nursing station, a conference/lecture room, two office rooms, a toilet, a shower room and a

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dressing room. The large exercise room shall include: low impact rubber flooring, a stretcher and wheel chair for emergency cases, an emergency carriage with defibrillator, an electrocardiogram machine (ECG), a television, a weighing scale, two manual blood pressure machines, one electronic blood pressure machine, two pulse oximeters, one oxygen tank, one dextrose machine, one refrigerator with thermo-sensor, two treadmills, two bicycles, one hand ergometer, weights, and steppers. The nursing station shall be equipped with a computer which access electronic health record (EHR) and a printer, shall accommodate patients' charts and education handouts, and a telephone to receive patients call. One office space is dedicated to the medical director, and the other space includes shared offices for the multi-disciplinary team members: Physiotherapist, advanced practice nurse, psychologist/social worker dietician, and occupational therapist.

Cardiac rehabilitation center personnel

The cardiac rehabilitation center team includes a medical director, an advanced practice nurse (APN) and a physical therapist dedicated to the center. Other specialists such as the dietitian, psychologist or social worker are called upon on consultation basis. The roles of the main personnel of the center are outlines below.

Cardiac rehabilitation medical director role

The responsibilities of the cardiac rehabilitation medical director are to oversee the multidisciplinary staff and make sure that they deliver high-quality care to all patients, make sure that referral and enrollment are being implemented correctly, make sure that individualized treatment plans are evidence based, oversee the progression of enrolled patients, educate enrolled patients and the multidisciplinary team, as well as

ensure that outcome indicators are based on the latest evidence based guidelines and are being monitored appropriately (King et al., 2012).

Physical therapist role

The physical therapist is responsible for the exercise training portion of the cardiac rehabilitation. He/she assesses the physical ability of patients at baseline, educates and trains patients in proper exercise procedures, and identifies with the medical director the exercise intensity threshold for each patient.

Advanced Practice Nurse Role

The main roles of the APN include visiting patients during hospitalization, introducing the cardiac rehabilitation service, performing initial physical assessment for cardiac rehabilitation, providing education about cardiovascular diseases and related risk factors, discussing patient's concerns, and addressing any misconceptions with the patient. The APN also coordinates the outpatient phase by receiving patients' calls, monitoring cardiac parameters and patients' responses during exercise, assessment and reassessment of the patients, reviewing medications and suggesting changes to the medical director or primary physician in order to optimize treatment regimen according to the latest guidelines, providing cardiac rehabilitation education for patients mostly related to lifestyle issues, providing smoking cessation counseling, monitoring quality indicators and preparing a monthly report with suggestions for improvement, providing emergency treatment as needed, monitoring the progression of the individualized treatment plan, and assisting in conducting research about cardiac rehabilitation.

Cardiac Rehabilitation Inclusion criteria

Patients eligible for enrollment in the cardiac rehabilitation program include those who underwent revascularization either by PTCA or CABG, those with diagnosis of chronic stable angina, stable heart failure, following insertion of AICD or Cardiac CRTD, following heart valve repair/replacement, heart transplantation and LVAD insertion, other Atherosclerotic Cardiovascular Diseases like peripheral arterial disease (BACPR, 2012).

Risk Stratification in Cardiac Rehabilitation Patients

The patients in the cardiac rehabilitation program will be classified according to the risk stratification model of cardiac rehabilitation by Roitman and colleagues (1998), which assigns patients to high, intermediate, and low risk.

High-risk category patients may have one or more of the following: Exercise test limited ≤ 5 metabolic equivalents (METS) where one MET is a multiple of the resting energy expenditure, and is used as a means of estimating cardiac functional capacity (1 MET = 3.5ml O₂/kg body weight/min); marked exercise-induced ischemia, this is can be noted by angina or 2 mm or more ST segment changes on EKG; or severe left ventricle dysfunction (ejection fraction < 30%); or ventricular arrhythmias while the patient is at rest; or ventricular arrhythmias exacerbating with exercise or after stress testing; or decrease in systolic blood pressure > 15 mm Hg with exercise; or recent MI (less than 6 months) that was complicated by serious ventricular arrhythmias, cardiogenic shock, or congestive heart failure; or survivor of sudden cardiac death (Roitman et al., 1998).

The intermediate risk category includes patients who have one of the following: Exercise test limited to 6-9 METS; or ischemic ECG response to exercise of < 2 mm of ST segment depression; or uncomplicated myocardial infarction, coronary artery bypass surgery, or angioplasty and has a post-cardiac event maximal functional capacity of 8 METS or less on ECG exercise test (Roitman et al., 1998).

The low risk category includes patients who have any of the following: Exercise test limited to > 9 METS; or asymptomatic at rest. (Roitman et al., 1998).

Description of Cardiac Rehabilitation Phases and Clinical pathway

The cardiac rehabilitation at AUBMC involves an in-patient phase and an outpatient phase during which patients progress in line with the literature.

The In-patient phase

Patients can be enrolled into cardiac rehabilitation program through: out-patient and in-patient settings. Out-patient patients shall meet the inclusion criteria listed above, and usually are referred by their primary physicians.

During the in-patient phase, patients who meet the criteria are admitted either to the Coronary Care Unit (CCU) or other units. Patients in CCU are usually admitted either for stabilization of their condition, medical management, or after procedures such as angioplasty; these patients are easily identified by simple rounds in CCU. Identification of patients who are admitted to regular floors is more challenging; so collaboration with cardiologists, vascular surgeons, and cardiothoracic surgeons is crucial for referral of these patients. After identifying a possible candidate for cardiac rehabilitation, the medical director or APN visits the patient early during

hospitalization, assesses him/her and fills the Screening for Cardiac Rehabilitation Form (see Appendix I).

If the patient is deemed candidate for cardiac rehabilitation, the medical director or APN introduces the service to the patient, provides him/her with the AHA fact sheet that describes the benefits of cardiac rehabilitation (Appendix II), clarifies any misconceptions by answering their questions, clarifies financial cost or coverage, lets the patient sign an Informed Consent for Cardiac Rehabilitation found in Appendix III, and fills the Referral for Cardiac Rehabilitation Form found in Appendix IV. After signing the informed consent, the medical director or APN assesses the patient and documents the findings on the initial assessment sheet Appendix V, and then starts early ambulation, mild activities, and education about current cardiac diseases and modification of risk factors. The medical director or the APN shall document if he/she ambulated the patient, the type and intensity of the activities, and topics covered during education on the In-Patient Phase Rehabilitation Form shown in Appendix VI. During hospitalization, the APN visits the patient daily and performs mild physical activities such as ambulation to chair or walking, and education about his/her current medical condition. The APN may consult the social worker for people with limited financial support. After discharge in one week, the APN calls the patients to remind them about their participation in the out-patient phase and the proposed participation date (Davies et al., 2010). If the patient is referred from out-hospital settings, then the referring physician fills the referral form Appendix IV and calls the cardiac rehabilitation services

The out-patient rehabilitation phase

The proposed times to start out-patient cardiac rehabilitation are modified from the NICE guidelines (2013). For MI patients the in-patient phase is started directly after

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admission with the out-patient program to be started four weeks after discharge. For patients with UA or NSTEMI, the in-patient cardiac rehabilitation is started directly after admission and the outpatient phase four weeks after discharge if treated by reperfusion therapy. For CABG patients, education shall start before surgery; physical activity shall be started immediately after transfer from Cardiac Surgery Unit (CSU). The out-patient phase shall be started six weeks after surgery. For stable congestive heart failure patients, rehabilitation starts in-patient and is continued four weeks after discharge (NICE, 2013).

During the first six weeks of the out-patient rehabilitation period, patients undergo 20 monitored sessions, three sessions per week. Details about management, education, and exercise will be mentioned in the core component section, exercise training section, and education/counseling section. In the first visit, the patient and cardiac rehabilitation staffs agree on a menu of cardiac rehabilitation activities. The medical director, APN, and physical therapist fill the out-patient cardiac rehabilitation form (Appendix VII), cardiac rehabilitation reassessment form (Appendix VIII), out-patient monitoring sheet (Appendix IX) that is updated in each subsequent visit. After six weeks, patients go through 20 unmonitored sessions, which are done in the cardiac rehabilitation center but without application of monitoring devices. The medical director, physical therapist, and APN continue filling the out-patient rehabilitation form and out-patient monitoring sheet (Jeng & Braun, 1994). The final assessment is done in the last week of the outpatient phase of cardiac rehabilitation, whereby the cardiac rehabilitation staffs address and reinforce the incomplete items in the cardiac rehabilitation menu, identify the need of extra sessions, and document cardiac rehabilitation Discharge Summary Form Appendix XI. Then the patient is discharged

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from the rehabilitation program. Then the medical director and APN provide informal discussion with enrolled patients.

Patients are followed up by the cardiac rehabilitation medical director after discharge from the rehabilitation program based on an agreement between the medical director and patient. During follow up, the prescribed exercises and agreed upon life style modifications are reinforced. Patients after discharge from cardiac rehabilitation will be receiving a once per year follow up phone call. Figure three displays the clinical pathway of cardiac rehabilitation program at AUBMC.

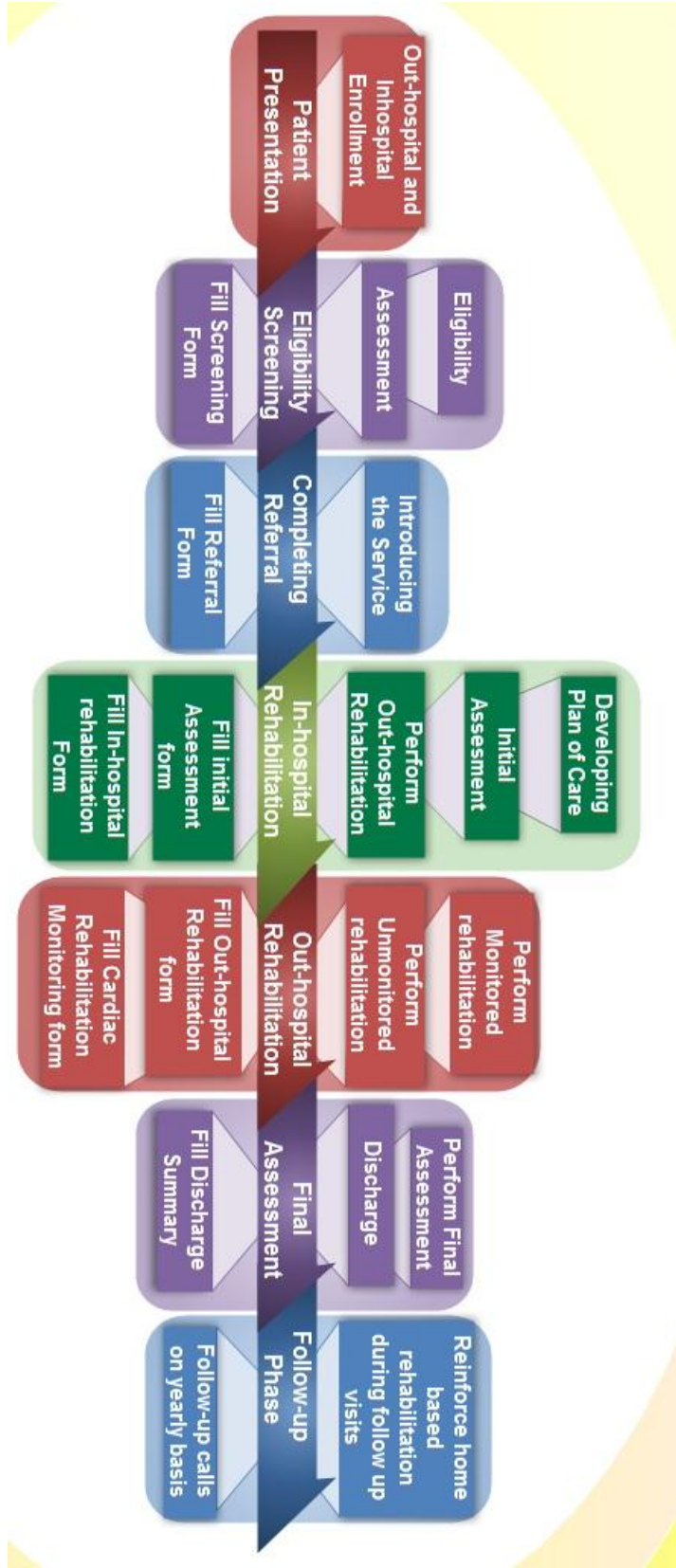


Figure 3: AUBMC Cardiac Rehabilitation Clinical Pathway

AUBMC Cardiac Rehabilitation Core Components

The delivery of cardiac rehabilitation program is based on the core components that are adapted from AHA, ACC, BACPR, NICE, JNC8, ATP IV, and American Diabetes Association (ADA) 2014. The core components of cardiac rehabilitation at AUBMC are: assessment and reassessment, nutritional counseling, blood pressure management, lipid management, diabetes management, smoking cessation, psychosocial management, exercise training, and education. In addition to the American model of cardiac rehabilitation (Balady et al., 2007), the components are integrated with some modifications.

First the 6 minutes' walk test shall be done on all participants prior to enrollment in the out-patient cardiac rehabilitation phase. For blood pressure management, ACE inhibitors are often initiated, or if not tolerated ARBs if patient is normotensive and has other comorbidities such as renal dysfunction or diabetes. For patients above 60 years of age and Blood Pressure (BP) > 150/90, then lifestyle modification and drug therapy including BBs, ACE I, Calcium Channel Blockers (CCBs), or thiazide diuretics are used. For patients younger than 60 years and BP more than 140/90, then lifestyle modification and drug therapy including Beta Blockers, ACE I, CCBs, or thiazide diuretics are to be used (James, 2014).

For dyslipidemia management high potency statins (Atorvastatin 40 mg, or Rosuvastatin 20 mg) are prescribed if tolerated, in addition to education about low fat diet. If the patient is not on statin therapy and there are no contraindications, a lipid panel is done, along with liver function test and Creatine Kinase, to check if triglycerides are ≥ 500 mg/dl, LDL-C ≥ 90 mg/dl. If the patient is 75 years or younger without contraindications for lipid therapy, start high intensity statin therapy such as

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Atorvastatin 40-80 mg or Rosuvastatin 20-40 mg as tolerated. If the patient is older than 75 years, then start moderate intensity therapy with Atorvastatin 10-20 mg , Rosuvastatin 5-10 or Simvastatin 20-40 mg or other available drugs as per the ATP IV recommendations. The expected outcomes include adherence to low saturated fat diet and medication (Stone et al., 2013).

For diabetes management patients are referred to an endocrinologist, if not referred before to start diabetes therapy if HbA1C \geq 6.5%, fasting blood sugar (FBS) \geq 126 mg/dL, 2 hours or random blood sugar \geq 200 mg/dL. Patients are educated about glucose monitoring. The expected outcomes include: keeping the primary doctor posted about changes in medications; and making sure that patient is able to detect symptoms of hypo/hyperglycemia and do self-monitoring of glucose. Long-term the FBS goal is 90-130 mg/dl with HbA1c $<$ 7%; BP $<$ 140/80 mm Hg and prevention of hypoglycemia and complications of diabetes (ADA, 2014).

In terms of the psychosocial management component, patients are to be screened for depression using the Patient Health Questionnaire 9 (PHQ) tool. PHQ 9 is to be filled by all patients upon the first visit. PHQ-9 scores of 5-9 represents minimal symptoms, 10-14 represents minor/mild depression, 15-19 represents moderate depression, and \geq 20 represents severe depression (Whilliams et al., 2014). Psychiatry will be consulted for patients who score 10 and above on the PHQ 9 (Kroenke et al., 2001). The level of anxiety will be assessed, in addition to type-A behaviors and whether or not the patient is on psychiatric medications. Educational sessions will be given about adjustment to heart disease, stress management, and health-related lifestyle changes. The staff will teach patients and provide them with self-help strategies. A psychiatrist will be consulted if psychiatric problems are limiting the patient's adherence to prescribed

changes, such as type A behaviors (Balady et al., 2007; Whaley et al., 2011). Family members may be included in psychological interventions (Whaley et al., 2011).

Moreover small group interaction and peer modeling can be used (Davies et al., 2010) as the program takes off and more patients who completed the program successfully can be invited to come and share their experiences with newly enrolled patients to boost their self-efficacy.

Before initiating the exercise program, the physical therapist assesses the patient for symptoms that may lead to exercise impedance. A 6-minute walk test is used to assess baseline physical ability. Then vital signs are assessed during exercise, noting ischemic changes on the monitor, and the findings are documented on out-patient monitoring form in Appendix IV. The exercises are tailored to the patient's needs and assessment findings and an exercise plan developed according to the last assessment, comorbidities, and patient expectation. The level of exercise is designed and approved by the medical director. The order of training includes frequency (F), intensity (I), duration (D), modalities (M), and progression (P). Physical exercises include aerobic exercise and/or resistant exercise. Aerobic exercises are done three times per week; I is 50-80% of exercise capacity; D: 20-60 minutes per session; and M: walking, treadmill, cycling, rowing, stair climbing, arm/leg ergometry. Resistance exercises are done with F: 3 days/week; I: 10-15 repetitions per set to moderate fatigue; D: 1-3 sets of 8-10 different upper and lower body exercises; and M: calisthenics, elastic bands, cuff/hand weights, dumbbells, free weights, wall, pulleys, or weight machines. Patients are started with warm up, and ended with cool down for each session and are instructed to update the prescriber about tolerance, so exercises are adjusted if needed (Balady et al., 2007). During exercise training the medical director, APN, and physical therapist provide

verbal reassurance and persuasive feedbacks to boost the patients' self-efficacy (Jeng & Braun, 1994).

Education program at cardiac rehabilitation

The education program shall be tailored to the patient's preference and medical condition. The Adult Education Theory (Knowles, 1990) will be taken into consideration when selecting the method of delivery of educational materials. The cardiac rehabilitation staff, dietician, and psychologist deliver the education sessions according to their specialty. The education sessions shall use one of the modern methods of education including: case based approach, team based approach, open discussions, and demonstration-return demonstration of procedures. The education program is to be delivered on the basis of two sessions per week all through the out-patient cardiac rehabilitation phase; each session is 30 minutes in duration. The program includes sessions about: simple pathophysiology of cardiac diseases, treatment modalities of cardiovascular diseases, smoking cessation series, stress management strategies, blood pressure measurement and control (including a practice demonstration for measuring BP), diabetes self-care including management, dextrose measurement and insulin injection; exercise at home, heart failure self-management, anticoagulation, basic life support, psychological problems encountered in cardiac patients, blood lipids, weight loss, and diet for cardiac patients. At the end of Out-patient cardiac rehabilitation program, the patients shall be provided with tips to protect your heart booklet Appendix X. Figure 4 illustrates the core components and stages of AUBMC cardiac rehabilitation program.

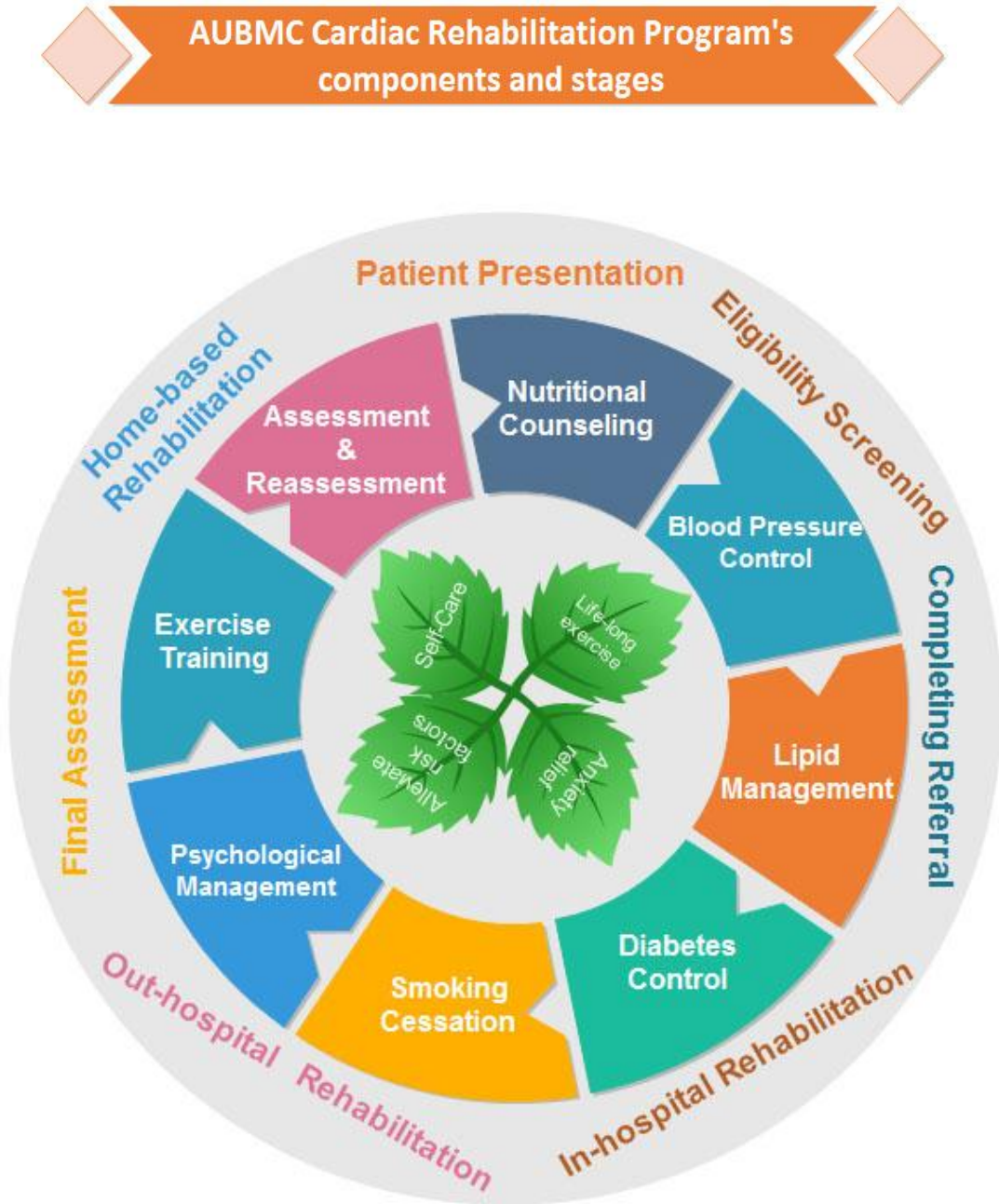


Figure 4: AUBMC Cardiac Rehabilitation stages and components

IMPLEMENTATION AND EVALUATION

Implementation of cardiac rehabilitation program

The proposal of cardiac rehabilitation program at AUBMC with its cost analysis will be sent to the medical center administration for approval. The cost analysis shall focus on the following parameters: staffing; which includes hiring cardiac rehabilitation center medical director, advanced practice nurse, and physical therapist; out-patient cardiac rehabilitation center space; and list of the equipment needed. The cost of the above parameters will be compared to the cost of readmission of patients, cost of treatment of recurrent events, and cost of lengthy hospitalizations. After getting the approval of the medical center administration, the dedicated space of the out-patient cardiac rehabilitation center will be furnished and equipped with the required furniture and devices. At the same time, the cardiac rehabilitation program staff shall be hired and trained on the components, stages of cardiac rehabilitation, and program quality indicators.

In preparation to launch this program, the cardiologists, vascular surgeons and cardiothoracic surgeons shall be made aware about the inclusion criteria in order not to deprive their patients from the benefits of the cardiac rehabilitation program. Patient education materials about cardiac rehabilitation, which is already done, shall be revised as needed, printed and placed in the medical center education cupboard. The medical house staff and hospital staff shall attend grand rounds about the program and its benefits. After completion of the above mentioned steps, the program will be launched in its in-patient phase, and then the out-patient phase will be started after having adequate number of participants.

Cardiac Rehabilitation Program Evaluation and Quality Indicators

The proposed cardiac rehabilitation program at AUBMC is aligned with the latest guidelines for core components, staffing, exercise prescription, and follow up care. The American Association of Cardiovascular and Pulmonary Rehabilitation (AACPR) is the body at the United States that certifies cardiac rehabilitation programs. The AACPR necessitates the following criteria to be aligned with its standards for the centers to get certified: Staff Competencies, Individualized Treatment Plan (ITP), Emergency Preparedness, Policy and Procedures, Exercise Prescription, Medical Emergencies, Clinical Outcome Assessment, Behavioral Outcome Assessment, Health Outcome Assessment, and Service Outcomes Assessment (AACPR, 2014).

Evaluation of core competencies

The cardiac rehabilitation center's staffs include the medical director, advanced practice nurse, and physical therapist. The medical director's role is aligned with the AHA/AACPR statement of Health Care Professionals at cardiac pulmonary rehabilitation (AACPR, 2014). The advanced practice nurse shall hold a master's degree of nursing from a recognized university with a critical care specialty, and must be an Advanced Cardiac Life Support (ACLS) provider. The physical therapist shall hold a BS degree in physical therapy and must be a Basic Life Support (BLS) provider.

Each patient enrolled in cardiac rehabilitation program shall undergo cardiac stress test, and undergo profound assessment to develop an individualized plan of care with tailored exercise prescription. Medical emergencies are handled primarily by the medical director and the APN who are ACLS providers, and then patients are stabilized for transfer to emergency department on the first floor for medical stabilization and care prior to discharge. A policy for cardiac rehabilitation is being prepared and updated with

this proposal and will be released prior to launching the program. The exercise prescription is individualized and based on the AHA/ACC guidelines as described above.

Outcome assessment is to be evaluated at the end of out-patient cardiac rehabilitation program, and with each contact in the follow-up phase. The outcome assessment of the cardiac rehabilitation program in general will be assessed and reported on quarterly basis, and will be the quality indicators of the programs.

Cardiac rehabilitation program quality indicators

As mentioned in the previous paragraph; the outcome measures of the cardiac rehabilitation program are the quality indicators for the program. The outcomes to be assessed are the rate of uptake to cardiac rehabilitation program, percentage of alive patients upon discharge, 6 months and 12 months after enrollment in the program, readmission rate at 6 months and at 12 months, percentage of patients who achieve 50% reduction in LDL-C from baseline, percentage of patients who achieve FBS, BP and body weight targets, and the percentage of patients who achieve 5 points reduction on the PHQ-9 questionnaire, as a 5 point change usually indicates movement from one category of depression to the other.

The rate of uptake to cardiac rehabilitation program is calculated by dividing the number of candidates for cardiac rehabilitation program on the number of enrolled patients on quarterly basis. The percentage of patients alive upon discharge, at 6 months and 12 months after enrollment in the program will be assessed by dividing the number of alive patients at discharge, 6 months, and 12 months over the number of enrolled patients and multiplying by 100. Readmission rate at 6 months and at 12 months will be

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calculated by dividing the number of patients who are admitted to the hospital at 6 and 12 months after enrollment in the program over the number of enrolled patients. This number is then compared to the readmission rate of candidate patients who were not enrolled in cardiac rehabilitation. The percentage of patients who achieve reduction by 50% of their LDL-C will be calculated by identifying patients who have LDL-C > 190 mg/dl at baseline to be in the denominator of the equation, and identifying the patients who achieve reduction by more than 50% of their LDL-C to be the nominator, then nominator will be divided by the dominator then multiplied by 100. Percentage of patients who achieve five points reduction in PHQ-9 questionnaire will be calculated by identifying patients who obtain a score of 10 or more on PHQ-9 questionnaire at enrollment in cardiac rehabilitation to be the denominator, then the number of patients who achieve reduction of 5 or more points in PHQ-9 questionnaire is identified and placed in the nominator, the nominator will be divided by denominator and multiplied by 100.

Expected challenges of the program

The most expected limitation of the program is the financial burden of the out-patient cardiac rehabilitation program. Currently, no insurance agency covers the out-patient rehabilitation program. The cost of the 40 out-patient sessions is a little high, and has to be paid by the patients themselves. There will be an effort to contain the cost of the un-funded sessions. Firstly the benefits of the program versus the cost of readmissions and lengthy hospitalizations of cardiovascular patients shall be reported to the National Social Security Fund (NSSF) to seek a permanent financial coverage of the out-patient program to the candidates. Secondly, funding agencies shall be contacted to

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seek coverage for people who cannot pay for the out-patient cardiac rehabilitation program.

With heart disease the leading cause of mortality and morbidity in Lebanon, and the importance of rehabilitation in promoting recovery and reducing further cardiovascular events and related complications, this project addresses a need for AUBMC and Lebanon. It is hoped that this proposed program will get the support it needs in order to improve the outcomes of cardiac patients.

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APPENDIX LIST

Appendix I: Screening for Cardiac Rehabilitation Form

Name: Age:

Case number:

Reason for eligibility for enrollment in cardiac rehabilitation program

- Following revascularization by Percutaneous Trans-luminal Coronary Angioplasty (PTCA)
- Following revascularization by Coronary Artery Bypass Graft (CABG)
- Chronic stable angina
- Stable heart failure
- Following insertion of Automatic Implanted Cardiac Defibrillator (AICD) device or Cardiac Resynchronization Therapy and Defibrillator device (CRTD)
- Following heart valve repair/replacement
- Following heart transplantation
- Following left ventricular assist devices (LVADs)
- Peripheral arterial disease

Name of Screener: Signature:

Date of Screening:

Appendix II: Fact

Sheet



FACTS

Cardiac Rehabilitation

Putting More Patients on the Road to Recovery

OVERVIEW

Each year, roughly 915,000 Americans will have a heart attack and more than 30% will have a second and potentially fatal event.¹ Cardiac rehabilitation (CR) reduces the risk of a future cardiac event by stabilizing, slowing or even reversing the progression of cardiovascular disease (CVD).² Patients with other cardiovascular diseases such as valve repair and heart failure also benefit from a CR program, such as exercise rehabilitation.

Yet despite its clear benefits, CR remains underutilized, particularly among women and minorities.^{3,4} Only 14% to 35% of eligible heart attack survivors and 31% of patients after coronary bypass surgery participate in a CR program.^{3,4} The utilization rate for eligible Medicare beneficiaries is an even lower 12%. However, evidence clearly shows that the more sessions patients attend, the better their outcomes and the lower their risk for heart attack and mortality compared with those who do not participate.^{5,6}

Among the main reasons for low participation in CR are: the lack of a referral or a strong endorsement from the patient's physician; limited or no health insurance coverage; conflicts with work or home responsibilities; and lack of program availability and access.²

The wide treatment gap between the benefits obtained from CR and participation in these programs is unacceptable. New delivery models for health care offer opportunities to address patient barriers and lower costs. At the same time, health practitioners must fully understand and appreciate the benefits of cardiac rehabilitation for their patients.

WHAT IS CARDIAC REHABILITATION?

Cardiac rehabilitation is a medically supervised program consisting of exercise training, education on heart healthy living, and

counseling to reduce stress and help patients return to an active lifestyle and recover more quickly. Cardiac rehabilitation offers a multifaceted and highly individualized approach to optimize the overall physical, mental, and social functioning of people with heart-related problems. It is recommended for both the inpatient and outpatient settings for the following conditions:^{7,8}

- Recent myocardial infarction (heart attack)
- Percutaneous coronary Intervention
- Coronary artery bypass grafting
- Chronic stable angina
- Heart failure
- Cardiac transplantation
- Valvular heart disease

Medicare provides reimbursement for all the recommended conditions except congestive heart failure. CR sessions are limited to a maximum of two one-hour sessions per-day up to 36 sessions furnished over a period of up to 36 weeks with the option for an additional 36 sessions. Reimbursement guidelines require CR programs to include five components.

CR Program Components
<ul style="list-style-type: none"> • Physician-prescribed exercise • Cardiac risk factor modification (education, counseling and behavioral intervention) • Psychosocial assessment • Outcomes assessment • Individualized treatment plan

BENEFITS OF CARDIAC REHABILITATION

- A 20-30% reduction in all-cause mortality rates^{9,10}
- Decreased mortality at up to 5 years post participation¹¹
- Reduced symptoms (angina, dyspnea, fatigue)¹²
- Reduction in nonfatal recurrent myocardial infarction over median follow-up of 12 months¹³
- Improved adherence with preventive medications¹²
- Increased exercise performance¹⁴

FACT SHEET: Cardiac Rehabilitation

- Improved health factors like lipids and blood pressure¹³
- Increased knowledge about cardiac disease and its management¹⁵
- Enhanced ability to perform activities of daily living¹³
- Improved health-related quality of life¹³
- Improved psychosocial symptoms¹⁶
- Reduced hospitalizations and use of medical resources¹³
- Increased ability to return to work or engage in leisure activities¹⁷

REASONS FOR LIMITED ENROLLMENT IN CARDIAC REHABILITATION PROGRAMS

Older and sicker patients, women, minority populations, patients with lower socioeconomic status or levels of education, are less likely to be referred to CR^{18,19} and are less likely to enroll after referral.²⁰ This is particularly significant because women and minorities are far more likely to die within 5 years after a first heart attack compared with white male patients.²

Barriers to Cardiac Rehabilitation^{2,21}

- Lack of referral or strong encouragement to participate from physician
- Limited follow-up or facilitation of enrollment after referral
- Limited or no health care coverage (cost)
- Work or home responsibilities
- Hours of operation that conflict with work demands
- Scarcity of programs in rural areas or low-income communities
- Distance to facility from patient's home
- Access to public transportation or parking issues
- Lack of perceived need for rehabilitation
- Gender-dominated programs with little racial diversity among staff
- Language problems and cultural beliefs

ACTION PLAN FOR IMPROVING ACCESS TO CARDIAC REHABILITATION

The American Heart Association is committed to public policies that will reduce the treatment gap for cardiac rehabilitation, with a specific focus on the most underserved populations: women, minorities, and low income individuals. These policies include:

- Expand Medicare coverage for CR to patients with congestive heart failure.
- Create and disseminate information on the benefits of CR to physicians and health plans to enhance referral, follow-up and to reduce costs.

- Provide information on CR to patient-center medical homes to facilitate coordination and follow-up with patients referred to CR.
- Support alternative models to traditional CR that address barriers associated with transportation and responsibilities at home or work.
- Monitor the inclusion of meaningful coverage for CR in state essential health benefit packages.

¹ Go AS, Mozaffarian D, et al.; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. *Circulation*. 2013;127:e6-e245.

² Balady GJ, et al. Referral, enrollment, and delivery of cardiac rehabilitation/secondary prevention programs at clinical centers and beyond: a presidential advisory from the American Heart Association. *Circulation*. 2011; 124:2951-2960.

³ Suaya JA, Shepard DS, Normand SL, Ades PA, Protas J, Stason WB. Use of cardiac rehabilitation by Medicare beneficiaries after myocardial infarction or coronary bypass surgery. *Circulation*. 2007;116:1653-1662.

⁴ Centers for Disease Control and Prevention (CDC). Receipt of outpatient cardiac rehabilitation among heart attack survivors—United States, 2003. *MMWR Morb Mortal Wkly Rep*. 2008;57:89-94.

⁵ Hammill BG, Curtis LH, Schulman KA, Whellan DJ. Relationship between cardiac rehabilitation and long-term risks of mortality and myocardial infarction among elderly medicare beneficiaries. *Circulation*. 2010 January 5; 121(1): 63-70.

⁶ Goel K, Lennon RJ et al. Impact of cardiac rehabilitation on mortality and cardiovascular events after percutaneous coronary intervention in the community. *Circulation*. published online May 16, 2011.

⁷ L. Anderson, C.D. Adams, E.M. Antman et al. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*, 50 (2007), pp. e1-e157.

⁸ LD Hillis, PK Smith, JL Anderson et al. 2011 ACCF/AHA guideline for coronary artery bypass graft surgery: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*, 124(2011), pp.123-210.

⁹ Geol K, Lennon RJ, Tilbury RT et al. Impact of Cardiac Rehabilitation on Mortality Following PCI. *Circulation*. 2011;123:2344-2352.

¹⁰ Taylor RS, Unal B, Critchley JA, Capewell S. Mortality reductions in patients receiving exercise-based cardiac rehabilitation: how much can be attributed to cardiovascular risk factor improvements? *Eur J Cardiovasc Prev Rehabil*. 2006;13(3):369-374.

¹¹ Suaya JA, STason WB, ADES PA, et al. Cardiac Rehabilitation and Survival in Older Coronary patients. *J. Am. Coll. Cardiol*. 209:54:25-33.

¹² Jolliffe JA, Rees K, Taylor RS, Thompson D, Oldridge N, Ebrahim S. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database Syst Rev*. 2001;(1):CD001800.

¹³ Stephens MB. Cardiac rehabilitation. *Am Fam Physician*. 2009 Nov 1;80(9):955-959.

¹⁴ Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *Am J Med*. 2004;116(10):682-692.

¹⁵ Clark AM, Hartling L, Vandermeer B, McAlister FA. Meta-analysis: secondary prevention programs for patients with coronary artery disease. *Ann Intern Med*. 2005;143(9):659-672.

¹⁶ Milani RV, Lavie CJ. Impact of cardiac rehabilitation on depression and its associated mortality. *Am J Med*. 2007;120(9):799-806.

¹⁷ Williams MA, Ades PA, Hamm LF, et al. Clinical evidence for a health benefit from cardiac rehabilitation: an update. *Am Heart J*. 2006;152(5):835-841.

¹⁸ Suaya JA, Shepard DS, Normand SL, Ades PA, Protas J, Stason WB. Use of cardiac rehabilitation by Medicare beneficiaries after myocardial infarction or coronary bypass surgery. *Circulation*. 2007;116:1653-1662.

¹⁹ Brown TM, Hernandez AF, Bittner V, Cannon CP, Ellrodt G, Liang L, Peterson ED, Piña IL, Safford MM, Fonarow GC. Predictors of cardiac rehabilitation referral in coronary artery disease patients: findings from the American Heart Association's Get With The Guidelines Program. *J Am Coll Cardiol*. 2009;54:515-521.

²⁰ Sanderson BK, Phillips MM, Gerald L, DiLillo V, Bittner V. Factors associated with the failure of patients to complete cardiac rehabilitation for medical and nonmedical reasons. *J Cardiopulm Rehabil*. 2003;23:281-289.

²¹ Dunlay SM et al., Barriers to participation in cardiac rehabilitation. *Am Heart J*. 2009 November; 158(5): 852-859.

Appendix III: Informed Consent for Cardiac Rehabilitation

الجامعة الأميركية في بيروت - المركز الطبي

AMERICAN UNIVERSITY OF BEIRUT MEDICAL CENTER

Patient information

Patient Name:

Hospital No.:

**INFORMED CONSENT
FOR PHYSICAL THERAPY**

For the following physical therapy procedure(s) (Physical Therapy):

1.
2.

To be completed by the treating physical therapist

I have explained to the patient, guardian, or legal representative the scope and limitations of this consent. I also explained the medical condition, the nature of the Physical Therapy, potential benefits and drawbacks, possible alternatives, likelihood of success, possible problems related to recovery, and possible results of non-treatment, and I believe that the information is understood.

Physical Therapist
(Name)

Signature: Date:

To be completed by the patient, guardian, or legal representative

I,
(Name of patient, guardian, or legal representative if patient is a minor or otherwise unable to sign)

do hereby declare that I voluntarily authorize and request the physical therapists of the American University of Beirut Medical Center (the "AUBMC") to perform the recommended Physical Therapy.

I declare that the scope and limitations of this consent have been explained to me, including the medical condition, the Physical Therapy, potential benefits and drawbacks, possible alternatives, likelihood of success, possible problems related to recovery, and possible results on non-treatment.

I acknowledge that no guarantee or assurance has been or is being given as to the results of the Physical Therapy.

**موافقة مستنيرة
للعلاج الفيزيائي**

للعلاجات الفيزيائية التالية ("علاج فيزيائي"):

1.
2.

يملأ من قبل المعالج الفيزيائي

لقد شرحت للمريض، للوصي، أو للممثل القانوني نطاق وحدود هذه الموافقة. كما شرحت الوضع الصحي، طبيعة العلاج الفيزيائي، المنافع والعوائق المحتملة، الخيارات البديلة الممكنة، إمكانية النجاح، المشاكل المحتملة المتعلقة بالشفاء والنتائج المحتملة في حال عدم العلاج، وأعتقد بأن ما شرحتة قد تم فهمه.

المعالج الفيزيائي:
(الإسم)

التوقيع: التاريخ:

يملأ من قبل المريض، وصيه أو ممثله القانوني

أنا،
(إسم المريض، أو وصيه، أو ممثله القانوني في حال كان المريض قاصراً أو عاجزاً عن التوقيع)

إنني أصرح بموجبه أنني أجاز وأطلب بملء إرادتي من المعالجين الفيزيائيين العاملين في المركز الطبي في الجامعة الأميركية في بيروت ("المركز الطبي") القيام بالعلاج الفيزيائي المقترح.

أصرح بأن نطاق وحدود هذه الموافقة قد تم شرحهما لي، لا سيما الوضع الصحي، العلاج الفيزيائي، المنافع والعوائق المحتملة، الخيارات البديلة الممكنة، إمكانية النجاح، المشاكل المحتملة المتعلقة بالشفاء والنتائج المحتملة في حال عدم العلاج.

أقر بأنه لم تعط لي أية ضمانات أو تأكيدات في ما يتعلق بنتائج العلاج الفيزيائي.

Cardiac Rehabilitation at AUBMC

<p>I understand that unforeseen conditions may arise during the Physical Therapy and I release the AUBMC, as well as its physicians and staff, from any liability arising from the Physical Therapy.</p> <p>I agree that all disputes or claims of any nature arising from the Physical Therapy at, and/or admission to, the AUBMC, shall be brought solely in the courts of Beirut, Lebanon, to the exclusion of the courts of any other jurisdiction, and I waive any objection to the jurisdiction and venue of the courts of Beirut and any right to claim that the courts of Beirut are inconvenient. I hereby agree that only the laws of Lebanon shall govern all disputes, litigation or claims of any nature arising from the Physical Therapy at, and/or the admission to, the AUBMC.</p> <p>It is the intention of the parties that this consent shall bind all parties whose claims may arise from the Physical Therapy and/or the admission to the AUBMC, including any spouse or heirs of the patient and any children, whether born or unborn, at the time of the occurrence giving rise to any dispute or claim.</p> <p>In the case of a pregnant woman, the term "patient," as used in this consent, shall mean both the pregnant woman and her expected child or children.</p> <p>I confirm that I have read and fully understand this consent and the provisions and explanations hereunder, and on their basis and with my own will and consent, I agree to the Physical Therapy.</p> <p>Signature: Date: (Patient)</p> <p>If the Signatory is someone other than the patient:</p> <p>I certify that I am signing this consent as the guardian or legal representative of the above-named patient, and with the full authority to enter into it.</p> <p>Name:..... Relationship..... (Guardian or legal representative)</p> <p>Signature:Date:</p>	<p>أدرك بأن حالات صحية غير متوقعة قد تحصل خلال العلاج الفيزيائي وأعفي المركز الطبي، كما وأطبائه والعاملين فيه من أية مسؤولية ناشئة عن العلاج الفيزيائي.</p> <p>أوافق على أن جميع النزاعات أو الدعاوى من أي نوع كانت التي قد تنشأ عن العلاج الفيزيائي في المركز الطبي و/أو عن الدخول إليه يجب أن تقام فقط أمام محاكم بيروت، لبنان، ودون سواها من المحاكم الأخرى، وإبني أتنازل عن أي اعتراض يتعلّق بصلاحيّة محاكم بيروت وإختصاصها المكاني كما أتنازل عن أي حق بالإدعاء بأن محاكم بيروت هي غير ذي إختصاص. وإبني أبدي بموجبه موافقتي على أن القوانين اللبنانية دون سواها من القوانين ستطبق على جميع النزاعات أوالدعاوى أوالمطالبات من أي نوع كانت التي قد تنشأ عن العلاج الفيزيائي في المركز الطبي و/أو عن الدخول إليه.</p> <p>إن نية الفرقاء هي أن تكون الموافقة الواردة في هذه المستند ملزمة لكافة الفرقاء الذين قد تنشأ لهم مطالبات ناتجة عن العلاج الفيزيائي و/أو عن الدخول إلى المركز الطبي، بما فيهم الزوج أو الزوجة أو ورثة المريض وأي من أولاده سواء كانوا قد ولدوا أم لا عند حدوث الواقعة التي أدت إلى نشوء النزاع أو المطالبة.</p> <p>وفيما يتعلق بالمرأة الحامل، فإن كلمة "المريض" الواردة في هذه الموافقة، تعني المرأة الحامل والولد أو الأولاد الذين تنتظر ولادتهم.</p> <p>أؤكد أنني قد قرأت وفهمت تماماً هذه الموافقة والبنود والشروحات التي تضمنتها، وعلى هذا الأساس وبملاء إرادتي، أوافق على العلاج الفيزيائي.</p> <p>التوقيع:..... التاريخ:..... (المريض)</p> <p>إذا كان الموقع هو شخص غير المريض:</p> <p>أفيد أنني أوقع هذه الموافقة كوصي أو كمثل قانوني للمريض المذكور أعلاه، وبأنني أتمتع بكافة الصلاحيات للقيام بذلك.</p> <p>الإسم:..... صلة القرابة..... (الوصي أو الممثل القانوني)</p> <p>التوقيع:..... التاريخ:.....</p>
---	---

Appendix IV: Referral for Cardiac Rehabilitation Form

Name: Phone number 2:
Age: Email:
Case number: Home address:
Referring physician: *For In-patients*
Date: Expected Discharge date:
Phone number 1: Admitting Physician:

Brief medical history:
.....
.....

Does the patient have ANY one of the below?

- Following revascularization by Percutaneous Trans-luminal Coronary Angioplasty (PTCA)
- Following revascularization by Coronary Artery Bypass Graft (CABG)
- Chronic stable angina
- Stable heart failure
- Following insertion of Automatic Implanted Cardiac Defibrillator (AICD) device or Cardiac Resynchronization Therapy and Defibrillator device (CRTD)
- Following heart valve repair/replacement
- Following heart transplantation
- Following left ventricular assist devices (LVADs)
- Peripheral arterial disease

If yes, then the patient is candidate for Cardiac rehabilitation.

- In-patient: consultation and in-patient cardiac rehabilitation
- Out-patient: consultation and out-patient cardiac rehabilitation (40 sessions)

Name of referrer: Signature:

Appendix V: Cardiac Rehabilitation Baseline Assessment Form

Name: Phone number 2:
 Age: Email:
 Case number: Home address:
 Referring physician: ***For In-patients***
 Date: Expected Discharge date:
 Phone number 1: Admitting Physician:

<i>Diagnosis</i>	
Coronary Heart Disease (CAD):	Angina <input type="checkbox"/> Unstable angina <input type="checkbox"/> STEMI <input type="checkbox"/> NSTEMI <input type="checkbox"/>
Heart Failure/valve diseases	Reduced Ejection Fraction Heart <input type="checkbox"/> Preserved Ejection Fraction Heart Failure <input type="checkbox"/> Valve Diseases <input type="checkbox"/> Pulmonary Hypertension <input type="checkbox"/>
Other ASCVD	PVD <input type="checkbox"/>

Last left Ventricle systolic function: Last left Ventricle diastolic function:

Medical History:

Surgical History:

Family History:

<i>Risk Factors</i>		
Family history of cardiac disease Y/N	Last total Triglycerides:	Height:
Alcohol Y/N	LDL:	Weight:
Total Cholesterol:	HDL:	Body Mass Index (BMI):
Hypertension: Y/N; BP: / Diabetes: Y/N; Last fasting blood sugar:; Last HBA1c:	Total Cholesterol:	Current Smoking status, cigarettes per day:

Cardiac Rehabilitation at AUBMC

Metabolic Equivalent Test (METs):	
Cardiac Rehabilitation's patient risk: (high, intermediate, low risk)	
Treatments	
PCI <input type="checkbox"/> Medical treatment <input type="checkbox"/> DES: LAD <input type="checkbox"/> RCA <input type="checkbox"/> CX <input type="checkbox"/> OM1 <input type="checkbox"/> Diagonal <input type="checkbox"/> BMS : LAD <input type="checkbox"/> RCA <input type="checkbox"/> CX <input type="checkbox"/> OM1 <input type="checkbox"/> Diagonal <input type="checkbox"/> CABG <input type="checkbox"/> AV Repair <input type="checkbox"/> AV Replace <input type="checkbox"/> MV Repair <input type="checkbox"/> MV Replace <input type="checkbox"/> Mechanical <input type="checkbox"/> Tissue <input type="checkbox"/> Trans-luminal Aortic Valve Intervention <input type="checkbox"/> Number of grafts: Vessels	
Devices: (Indicate date if the treatment done prior to this hospitalization)	
Cardiac Resynchronization Therapy and Defibrillator device CRTD <input type="checkbox"/> Automatic Intra-Cardiac defibrillator <input type="checkbox"/>	
Pace maker <input type="checkbox"/> Left Ventricle Assisting Device <input type="checkbox"/>	
Physical activity	
Daily activities	Exercises: time/day/week/...../.....
Sedentary <input type="checkbox"/> Moderate activities <input type="checkbox"/> Heavy activities <input type="checkbox"/>	Type of exercise: Walking/Swimming/Jogging/Running
Last Echocardiogram: EF: %, Diastolic function: Last Pro-BNP:	

Physical exam	
<i>Subjective</i>	<i>Objective</i>
NYHA: I, II, III, IV, NAP	Blood pressure: HR: Beats per minutes, RR: Breaths per minute. Temperature:
Stairs climbing:	12 leads EKG:
PND: Yes/No.....	Heart sounds: s1, s2, s3, s4
Angina: ... Yes/No.....	Murmurs: Y/N, Location:
Nocturia (times per night):	Lung exam: Clear, Crackles, Wheezing, Ronchi, Location:
PHQ – 9 questionnaire total score:	Jugular Veins Distension: Y/N
Others:	Ascites: Y/N
.....	Edema, Location: Grade: I, II, III, IV
.....	Others:

Cardiac Rehabilitation physician: Signature:

Cardiac Rehabilitation PT: Signature:

Cardiac Rehabilitation APN: Signature:

Appendix VI: In-patient Cardiac Rehabilitation form

Name: Admission date:
 Age: Prescribed activity:
 Case number: METs:
 Primary Physician: Date of last cardiac event/procedure:
 Date:

Physical activity

	Range of motion exercises	Assistance in ambulation	Walking	Exercise limiting conditions
Day one				
Day two				
Day three				
Day four				
Day five				
Day six				
Day seven				
Day eight				
Day nine				
Day ten				
Day 11				
Day 12				
Day 13				
Day 14				
Day 15				
Day 16				
Day 17				
Day 18				
Day 19				
Day 20				

Education

Date	Topic	Need to reinforce

Cardiac Rehabilitation physician: Signature:

Cardiac Rehabilitation APN: Signature:

Appendix VII: Out-patient Cardiac Rehabilitation form

Name: Cardiac Rehabilitation APN:
 Age:
 Case number: Cardiac Rehabilitation PT:
 Cardiac Rehabilitation physician:

Monitored Cardiac Rehabilitation

Session #/Date	Cardiac Rehabilitation activities	Exercise training
	In each session mention interventions in: Education, Nutrition counseling, Psychological interventions, Management of risk factors: Hypertension, Dyslipidemia, Diabetes, and Smoking cessation. Starting second session fill cardiac rehabilitation reassessment form.	In each session mention: Exercise limiting conditions; Training: frequency (F), intensity (I), duration (D), modalities (M), and progression (P); Type: Aerobic, Resistance. In each session fill and update cardiac rehabilitation monitoring form.
1 st	Fill Cardiac Rehabilitation Initial Assessment form. Obtain Metabolic Assessment Test (METs:) Administer PHQ-9 Questionnaire	
Subsequent sessions	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
19		
20		

Unmonitored Cardiac Rehabilitation

Session #/Date	Cardiac Rehabilitation activities	Exercise training
	In each session mention interventions in: Education, Nutrition counseling, Psychological interventions, Management of risk factors: Hypertension, Dyslipidemia, Diabetes, Smoking cessation, and fill cardiac rehabilitation reassessment form. Address incomplete cardiac rehabilitation activities in the last week.	In each session mention: Exercise limiting conditions; Training: frequency (F), intensity (I), duration (D), modalities (M), and progression (P); Type: Aerobic, Resistance. In each session fill and update cardiac rehabilitation monitoring form.
All sessions	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
All sessions	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	Administer PHQ-9 Questionnaire in the last session Obtain Metabolic Assessment Test (METs:) in the last session	

Cardiac Rehabilitation physician: Signature:

Cardiac Rehabilitation APN: Signature:

Cardiac Rehabilitation PT: Signature:

Appendix VIII: Cardiac Rehabilitation Reassessment form

<i>Physical exam</i>	
<i>Subjective</i>	<i>Objective</i>
NYHA: I, II, III, IV, NAP Metabolic Equivalent Test (METs:) Current Smoking status, cigarettes per day:	Blood pressure: HR: Beats per minutes, RR: Breaths per minute. Temperature:
Stairs climbing:	12 leads EKG:
PND: Yes/No.....	Heart sounds: s1, s2, s3, s4
Angina: ... Yes/No.....	Murmurs: Y/N, Location:
Nocturia (times per night):	Lung exam: Clear, Crackles, Wheezing, Ronchi, Location: Jugular Veins Distension: Y/N
Others:	Ascites: Y/N Edema, Location: Grade: I, II, III, IV Others:
Medications modification from the last visit:	

Cardiac Rehabilitation APN: Signature:

Appendix IX: Out-patient Cardiac Rehabilitation monitoring sheet

Name: Cardiac Rehabilitation APN:
 Age:
 Case number: Cardiac Rehabilitation PT:
 Cardiac Rehabilitation physician:

Parameters on arrival

Visit number/date				
Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Parameters after treadmill

Duration				
Mets				
Speed				
Incline				
Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Parameters after stationary bicycle

Duration				
Mets				
Speed				
Grade				
Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Parameters after upper extremities ergometer

Visit number/date				
Duration				
Mets				
Speed				
Grade				
Intensity				
Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Parameters after strengthening exercises

Number of repetitions				
Mets				
Weight	Kg	Kg	Kg	Kg
Elastic band color				
Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Parameters on discharge

Blood pressure	mmhg	mmhg	mmhg	mmhg
Heart Rate	bpm	bpm	bpm	bpm
Spo2	%	%	%	%
Dyspnea Borg score	/	/	/	/
Time				
Recorded by:				

Cardiac Rehabilitation PT: Signature:

Cardiac Rehabilitation APN: Signature:

Appendix X: Tips to protect your heart

Heart-healthy food

- Emphasize on fruits, vegetables, whole grains, low-fat dairy products, poultry, fish and nuts.
- Limit intake of red meat and sugary foods and beverages.
- Select lean meat with minimal visible fat.
- Cook a day ahead of time. Stews, boiled meat, soup stock or other dishes in which fat cooks into the liquid can be refrigerated and the hardened fat removed from the top.
- Read labels carefully and choose processed meats only occasionally. Pay attention to sodium and fat components.
- Include fish in your diet
- Increase fiber & whole grain
- Use liquid vegetable oil instead of solid one
- Remove the skin from chicken or turkey before cooking

Stay physically active

- Just 40 minutes of aerobic exercise (Brisk walking, swimming, bicycling or a dance) moderate to vigorous intensity done three to seven times a week is enough to lower both cholesterol and high blood pressure.
- Pace yourself. Don't do too much, too soon. Give your body time to rest between workouts.
- Don't exercise outdoors when it is too cold, hot, or humid.
- Skip extremely hot and cold showers or sauna baths after exercise.
- Don't exercise in hilly areas
- If your exercise program gets interrupted for a few days (due to illness, vacation, or bad weather, as examples), ease back into the routine. Begin with a reduced level of activity, and gradually increase it until you're back where you started.

When to STOP exercise?

- Stop exercising if you experience any undue shortness of breath
- Chest pain / discomfort (or pain in your neck/arm/jaw)
- Nausea/headaches/dizziness
- Inappropriate tiredness
- Persistent palpitations

Control your blood glucose level

- Check your blood glucose every day.

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- Each time you check your blood glucose, write the number in your record book.
- Check your feet every day for cuts, blisters, sores, swelling, redness, or sore toenails.
- Keep your blood glucose under control.
- You can see if your blood glucose is under control by having an A1C test at least twice a year.
- The A1C test tells you your average blood glucose for the past 2 to 3 months.
- The target for most people with diabetes is below 7.
- In some people with heart disease or other special circumstances, their doctor may recommend slightly higher levels of A1C.

Take your medication on time

Stop smoking, and avoid second hand exposure

If you are a heart failure patient

- Limit your fluid intake according to the instructions given by your team
- Weigh yourself daily; call your physician if you gain more than 1.5 kg in two days
- Take your yearly immunization

When you should come to emergency room?

- Sudden chest pain persisting more than 10 minutes despite rest
- If you feel unwell: sweaty, dizzy, or dyspneic while you are in rest
- Unusual palpitations persisting despite having rest
- Sudden persistent cough

Myths about eating habits for cardiac patients

- Using margarine instead of butter will help lower my cholesterol.
- Thin people don't have to worry about high cholesterol.
- My doctor hasn't said anything about my cholesterol, so I don't have to worry.
- Since the nutrition label on my favorite food says there's no cholesterol, I can be sure that it's a "heart-healthy" choice.
- Since I started taking medication for my high cholesterol, I don't have to worry about what I eat.
- I'm a woman so I don't have to worry about high cholesterol. It's a man's problem.
- You don't need to have your cholesterol checked until you reach middle age.

Appendix XI: Cardiac Rehabilitation discharge summary form

Name: Cardiac Rehabilitation PT:
Age:
Case number: Date of first monitored
Cardiac Rehabilitation physician: Cardiac rehabilitation session:
..... Date of last unmonitored
Cardiac Rehabilitation APN: cardiac rehabilitation session:
.....

Medical History:

.....
.....

Surgical History:

.....
.....

Medications at start of cardiac rehabilitation:

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.....

Indication for cardiac rehabilitation:

Following revascularization by Percutaneous Trans-luminal Coronary Angioplasty (PTCA); Following revascularization by Coronary Artery Bypass Graft (CABG); Chronic stable angina; Stable heart failure ; Following insertion of Automatic Implanted Cardiac Defibrillator (AICD) device or Cardiac Resynchronization Therapy and Defibrillator device (CRTD) ; Following heart valve repair/replacement; Following heart transplantation ; Following left ventricular assist devices (LVADs); Peripheral Arterial Disease

Metabolic Equivalent Test (METs:) on first monitored cardiac rehabilitation session.

Metabolic Equivalent Test (METs:) on last unmonitored cardiac rehabilitation session.

Cardiac rehabilitation patient risk on first monitored cardiac rehabilitation session: (high, intermediate, low risk)

Cardiac rehabilitation patient risk on last unmonitored cardiac rehabilitation session: (high, intermediate, low risk)

NYHA on first monitored cardiac rehabilitation session: I, II, III, IV, NAP

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NYHA on last unmonitored cardiac rehabilitation session: I, II, III, IV, NAP

PHQ-9 questionnaire total score on first monitored cardiac rehabilitation session:
.....

PHQ-9 questionnaire total score on last unmonitored cardiac rehabilitation session:
.....

Number of **completed monitored cardiac rehabilitation** sessions:

Number of **completed unmonitored cardiac rehabilitation** sessions:

Complications/Emergencies occurred during cardiac rehabilitations: Y/N, if yes
mentions what are the complications occurred:

.....
.....

Education topics covered during cardiac rehabilitation:

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Life style modifications during cardiac rehabilitation:

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Exercise limiting conditions:

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.....

Cardiac Rehabilitation physician: Signature:

Cardiac Rehabilitation APN: Signature:

Cardiac Rehabilitation PT: Signature: