

Program Profile

The Design and Implementation of a Home-Based Cardiac Rehabilitation Program

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A home-based cardiac rehabilitation program improves access and enrollment by using an evidence-based alternative model of care.

Despite a 30% decline in heart disease mortality from 2001 to 2011, heart disease prevalence is on the rise, responsible for 1 of every 3 deaths in the U.S.¹ Cardiac rehabilitation (CR) is an evidence-based, secondary prevention strategy that has been proven effective in preventing future cardiovascular events and decreasing heart disease mortality.²⁻⁴ The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) is the leading authority on CR and provides guidelines for CR programs. The AACVPR and the American Heart Association (AHA) published core components for CR programs deemed essential for all CR/secondary prevention programs, including evaluations, interventions, and ex-

pected outcomes.⁵ These core components are aimed at promoting a healthy lifestyle and increasing function and well-being while reducing injury, death, and the reoccurrence of disease.⁶

In a meta-analysis of 47 trials with 10,794 participants, CR reduced cardiovascular disease (CVD) mortality and hospital admissions by 26% and 18%, respectively.² Performance measures (Class 1, Level A) recommend the following types of patients should be referred from the inpatient setting: “all patients hospitalized with a primary diagnosis of an acute myocardial infarction (MI) or chronic stable angina, or who during hospitalization have undergone coronary artery bypass graft (CABG) surgery, a percutaneous coronary intervention (PCI), cardiac valve surgery, or cardiac transplantation.”⁷ However, despite overwhelming evidence and widespread endorsement (Class 1, Level A), service utilization, uptake, and patient adherence to CR programs remain suboptimal. In a U.S. study of claims from > 250,000 Medicare beneficiaries, < 30% of eligible patients participated in some type of CR pro-

gram.⁸ In response to poor participation, a presidential advisory from the AHA in 2011 stated, “the remarkably wide treatment gap between scientific evidence of the benefits of cardiac rehabilitation and clinical implementation of rehabilitation programs is unacceptable.”⁹

This treatment gap is echoed throughout the VHA. Schopfer and colleagues found that only 28% of the 124 VAMCs that provide inpatient care also offer a supervised, facility-based CR program.¹⁰ Furthermore, only 10.3% of eligible veterans participated in at least 1 CR session (VA or non-VA). On a systemic level, low patient referral rates and inadequate third-party reimbursement were the most common barriers to participation in CR.^{10,11} On a patient level, distance was by far the largest barrier to veterans receiving CR. Currently, 74% of the 9.3 million VA-enrolled veterans live at least 1 hour by car from a VA facility that offers CR.⁹ Within some regions of the VHA, there are no VA facility-based CR programs. For example, VISN 21 has no facility-based CR programs. At the same time,

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referral of eligible veterans to facility-based CR outside the VA remains low. Prior to April 2013, < 2% of qualified patients residing in VISN 21 were being referred to Non-VA CR programs, making it the VISN with the lowest participation rate for CR.

One potential solution that addresses both systemic and patient barriers to CR utilization is home-based CR. Veterans within the wide geographic area of VISN 21 are referred to San Francisco VAMC (SFVAMC) for ischemic heart disease, cardiovascular revascularization, and cardiac valve surgeries. In 2013, a comprehensive home-based CR program named The Healthy Heart Program was developed based on a successful evidence-based CVD secondary prevention program. The Healthy Heart Program is designed to be a physician-directed, nurse case-managed, customized exercise and lifestyle program that provides a safe and convenient way for veterans to participate in CR. Exercise and disease self-management education are the cornerstones of the Healthy Heart Program. The program's multidisciplinary team includes physicians, nurses, a dietician, an exercise physiologist, and a health behavior psychologist.

AN ALTERNATIVE APPROACH

DeBusk and colleagues demonstrated that a physician-directed, nurse-managed, home-based cardiac risk-factor modification program improved smoking cessation, reduced low-density lipoprotein cholesterol, and increased exercise capacity compared with usual care.¹² The results of this study helped pave the way for one of the first CR programs with a strong home-based element. The MULTIFIT program was jointly developed by the Stanford Coronary Rehabilitation Program and Kaiser

Permanente (Oakland, CA) in 1995. MULTIFIT is a nurse-based care model for CVD prevention.

Further research that evaluated other home-based programs showed similar promise. A Cochrane review demonstrated that home- and facility-based CR programs were equal in cardiac risk factor reduction, reduced hospital readmissions and mortality rates, and improved quality of life (QOL).¹³ Cost-effectiveness also seemed to be similar in both home- and hospital-based CR programs.¹⁴ A meta-analysis of telephone support interventions for coronary

automatic referral system for CR evaluation. Consults for CR evaluation were embedded within the post-CABG and PCI order sets in the electronic health record. Laboratory troponin alerts were created to alert CR staff of patients with elevated troponins, which identified patients admitted for acute MI. Healthy Heart Program staff members received the referrals once a patient was admitted to the unit following their heart procedure. Early referrals for evaluation allowed staff to begin a chart review of all eligible patients and to follow the patient's course of recovery. Most

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artery disease demonstrated a 38% decrease in rehospitalizations and a 32% increase in the number of participants who stopped smoking.¹⁵ In addition, patients with time constraints (eg, work, family obligations) preferred home-based CR programs for the convenience and accessibility that these programs offer.¹⁶ Home-based CR programs may have better completion rates compared with that of facility-based programs.¹⁷ The American College of Cardiology and AHA updated guidelines for CR include home-based CR as a substitute for facility-based CR for low-risk patients (Class I, Level A).¹⁸

Referrals

To address the problems with referrals that plague other CR programs, staff of the Healthy Heart Program worked closely with interventional cardiology and the cardiothoracic team, including the clinical informatics coordinators, to develop an

consults were generated during hospitalization for one of the indications; however, a minority of consults come from both the cardiology and primary care clinics.

Three Phases of CR

The AACVPR describes the challenges and opportunities found throughout the CR continuum.⁵ Over the past several decades, the continuum of care was more program centered and service utilization was more isolated. Today, CR is viewed as more process oriented and coordinates care across many professionals and services. Phase 1 inpatient CR begins in the hospital and is a shared responsibility between several services. Shortened hospital stays have led to innovative solutions for early ambulation, risk factor education, and discharge planning, including enrollment into phase 2 CR. Phase 2, also known as early outpatient, should begin within 1 to 2 weeks

Table. Inclusion/Exclusion Criteria

<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Acute myocardial infarction • Coronary artery bypass graft surgery • Obstructive coronary artery disease ± percutaneous coronary intervention • Stable angina • Cardiac valve repair/replacement • Cardiac transplantation • Congestive heart failure (NYHA II-III)
<p>Exclusion criteria</p> <ul style="list-style-type: none"> • Staged per cutaneous coronary intervention with significant remaining lesion • Decompensated heart failure (NYHA IV) • Unstable angina • Documented history of nonsustained VT, sustained VT, or VF without definitive treatment (anti-arrhythmic drugs, implantable cardiac-defibrillator, ablation) • Documented history of recurrent syncope without definitive diagnosis and/or presently undergoing workup • Symptomatic valvular disease • Severe hypertension (SBP > 200 mm Hg or DBP > 100 mm Hg) • Dementia/cognitive impairment • Discharge to long-term skilled nursing facility (> 30 d) • Significant movement disorder that interferes with exercise training • 6-minute walk test < 75 m (postsurgical) or < 150 m (not postsurgical) • Atrial arrhythmia not rate controlled • Mobitz Type II or third-degree atrioventricular block without pacemaker

Abbreviations: DBP, diastolic blood pressure; NYHA, New York Heart Association; SBP, systolic blood pressure; VF, ventricular fibrillation; VT, ventricular tachycardia.

postevent in healthier patients and can last between 6 and 12 weeks postdischarge. Phase 3 (maintenance phase) should begin immediately at the conclusion of phase 2.

Phase 1

Prior to the advent of the Healthy Heart Program, secondary prevention education was not done at the bedside for SFVAMC patients following cardiac revascularization. The AACVPR recommends patient assessment, mobilization, risk-factor identification and education, and facilitation into outpatient CR as essential components of phase 1 CR.⁵ The Healthy Heart Program clinician initiates phase 1 CR by examining cardiac risk factor management for all referred patients. Physical and car-

diac risk factor assessments are accomplished by completing a detailed chart review and interview with the patient. During this interview with the patient, the clinician evaluates cognitive function and readiness to learn. Staff will interview the patient further to assess the overall patient needs, including availability of social support, resources to maintain optimal health, and the need for secondary preventive education. For the PCI patient, the interview may occur in the hours following their procedure; for the surgical patient, this bedside visit typically occurs postoperative day 3 or 4.

A standardized cardiac risk factor evaluation tool was designed, which also serves as an education form to help guide the conversation on risk

factor management. The interactive, patient-centered form includes opportunities to review risk, discuss current laboratory values (eg, lipids and hemoglobin A_{1c}), and establish individualized goals based on patient preference and recommended guidelines. Healthy Heart Program staff assist the patient in formulating achievable goals using the SMART (specific, measurable, attainable, realistic, and time-related) criteria.¹⁹ Immediately after a heart event or procedure, patients often feel highly motivated to initiate lifestyle changes.²⁰ However, PCI patients may have a short window of opportunity for learning between their readiness to learn state and before the activities of discharge. Staff use these opportunities as a teachable moment and to increase enrollment into outpatient CR (phase 2).

The provider performs a thorough chart review and bedside consultation to determine whether home-based CR is indicated, feasible, and appropriate. Not every patient that is referred will be enrolled in CR. Patients have the option to opt out. In addition, clinical staff adhere to the program protocol's exclusion criteria.

Absolute contraindications for home enrollment include unstable angina, staged cardiac procedure (PCI and surgery), complex ventricular arrhythmias, severe or symptomatic aortic stenosis, decompensated heart failure, and uncontrolled hypertension (Table). Patients deemed high risk for home-based CR may be referred to a non-VA facility-based CR program. Risk stratification, using the Canadian Cardiovascular Society Grading of Angina Pectoris, is a continuous process that is used to identify patients who may move from moderate to high risk, both before and during the program.^{21,22}

Phases 2 and 3

Phase 2 of the Healthy Heart Program CR includes physical activity, risk-factor modification, nutritional guidance, psychosocial modification, a return to previous activities, and an improved QOL. Prior to entry into the program, a submaximal exercise test, the 6-minute walk test (6MWT), is used as both a qualifying test and for developing the initial exercise prescription.²² The minimum 6MWT distance needed to qualify is 75 m for postoperative and 150 m for nonsurgical patients. The 6MWT is performed in-hospital for patients who were admitted for stable angina, PCI, and are > 4 days following acute MI.²³ Cardiothoracic surgery patients are tested at their first follow-up clinic visit (typically 2-3 weeks postoperatively). The clinician monitors the heart rate with either a wearable device or via inpatient telemetry monitors. This exercise testing also serves as a motivational tool for patients to gain confidence in their ability to begin to exercise at home.

Each participant receives a workbook and a DVD titled *An Active Partnership for the Health of Your Heart*. A personal health journal is provided for documenting vital signs, activity, and dietary intake. In addition, each participant receives equipment on an as-needed basis, including resistance bands, a weight scale, a blood pressure cuff, a pedometer/heart rate monitoring device, an exercise peddler or stationary bike, and a dietary video. Baseline assessments include the General Anxiety Disorder (GAD-7), Personal Health Questionnaire (PHQ-9) and a nutrition (Rate Your Plate) questionnaire. A cognitive function test (Montreal Cognitive Assessment) is used on an as-needed basis.

Nine 30-minute telephone follow-up sessions are scheduled within a

12-week period (weekly for the first 6 weeks, then biweekly). Topics covered are customized and include exercise; nutrition; medications; smoking cessation; and diabetes, hypertension, and weight management. Via a telephone follow-up session, the program nurses and patients codevelop an electronic individualized treatment plan that is tailored to the patient's diagnosis, individual goals, and preferences. Clinicians teach participants how to self-monitor exercise, using a continuous heart rate monitoring device (Mio Alpha II or Fuse) and the 6-20 Borg dyspnea rating scale.²⁴ Initially, moderate intensity exercise is prescribed with a target heart rate that is 60% to 75% of the 6MWT peak heart rate and an initial Borg scale target (11-14 on 20 point scale). The program physicians approve the treatment plan at the first patient visit and every 30 days until phase 2 is complete.

Patients who have completed early outpatient phase 2 CR can benefit from continuing to a phase 3 CR program.²⁵ Participants of the Healthy Heart Program automatically are enrolled in phase 3, which is a long-term maintenance program that includes monthly or bimonthly phone calls for up to 1-year posthospital discharge. The goal is to support each veteran's transition to a long-term healthy lifestyle that includes regular exercise.

Client-Clinician Partnership

The Healthy Heart Program establishes the client-clinician partnership prior to discharge for hospitalized patients. The nurse who initiates phase 1 at the bedside is the primary clinician throughout phases 2 and 3 with the exception of a dietitian, psychologist, and/or exercise physiologist who provide follow-up calls as needed. Throughout these

weekly follow-up phone sessions, the clinician gains an appreciation of the patient's understanding of his or her disease, patterns of behavior, desire to change, confidence in being able to change, potential barriers, and responses to obstacles. Clinicians in this setting are empathetic, supportive, and nonjudgmental. They encourage positive changes no matter how small and express concern when the patient is having difficulty.

Tailored Behavioral Change

The clinician's responsibility is to listen to the patient's concerns, assess their level of commitment for changing health behaviors, and provide guidance and support at the patient's current level. The clinician applies the Transtheoretical Model founded on the Stages of Change principals to help understand and provide guidance based on the patient's feelings about health behavior change.²⁶ People are actively open to changing behaviors by only 20% at any given time.²⁷ Therefore, action-oriented guidance for patients who are in the contemplative stage would not be helpful. This patient-centered approach promotes patients' self-awareness, participation, and understanding of their decision-making role in their health management. Ultimately, individuals must take ownership of their health care maintenance for sustained behavioral change and medication management, and clinicians should facilitate that process.

DISCUSSION

Secondary prevention strategies for heart disease continue to be underutilized. The Healthy Heart Program aims to improve participation in CR, improve QOL, help patients understand their heart disease, and support these patients psychologically. An

advantage of this program is that it begins inpatient CR immediately following the heart event, when many patients often are more receptive to behavioral change support and guidance. Another advantage is that the program breaks down barriers to access, which is especially important in the veteran population. The Healthy Heart Program provides support and guidance for exercise and cardiac risk factor management to patients who otherwise would have not participated in any type of CR program.

A home-based CR program can be adopted independently or in conjunction with a facility-based program to which patients lack access. Furthermore, home-based CR programs function well as a phase 3 maintenance program at the completion of a traditional CR program. Since its inception, the Healthy Heart Program has increased the number of veterans enrolled in cardiac rehabilitation at the SFVAMC dramatically, from < 1% in FY 2012 to > 40% in FY 2015.

Program Limitations

One potential disadvantage of a home-based CR program is patients' fear of returning to an exercise routine following a cardiac event. In addition, a lack of in-person supervision in home-based CR can lead patients to engage in less intensive activity than in facility-based CR. Other disadvantages include a lack of social support, less patient accountability, and safety concerns for sicker patients. Staff have consulted on several patients who expressed a lack of confidence in their ability to do well in this type of program, where accountability for exercising is self-reported. Staff referred these patients, who had the means to travel, to a non-VA facility-based CR program of their choice. Ideally, patients would

have the choice between facility- or home-based programs or be able to choose a hybrid program that would best meet their needs.

Another identified limitation of this program was the lack of group support and in-person interactions with rehabilitation staff. Finally, although this program uses mobile devices with heart rate monitoring technology, these devices currently lack the capability to remotely share data with clinicians. Clinicians are reliant on the patient's use of a personal health journal and memory. Subjective patient reporting has been found to be overestimated; therefore, more objective methods to measure important clinical outcomes are necessary²⁸

CONCLUSION

Facility-based CR is effective but underutilized. Alternative secondary programs are needed to help meet patient needs and overcome patient barriers. One promising approach to increase participation is home-based CR. Home-based CR programs have the potential to increase CR uptake and adherence. Home-based CR optimizes enrollment through evidence-based alternative models due to improved access. The future of CR will become highly individualized and multifaceted as a result of available mobile technologies and Internet-based tools, which will help increase the number of participants and expand the reach of cardiac risk factor management programs beyond the facility-based setting. A home-based program will be a valuable addition to facility-based programs as a stand-alone program or adopted into a hybrid program. ●

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