

# Developing an Adapted Cardiac Rehabilitation Training for Home Care Clinicians

## PATIENT PERSPECTIVES, CLINICIAN KNOWLEDGE, AND CURRICULUM OVERVIEW

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**Purpose:** There is limited evidence that home care clinicians receive education on the core competencies of cardiac rehabilitation (CR). This article describes the development and implementation of a CR training program adapted for home care clinicians, which incorporated the viewpoints of homebound patients with cardiovascular disease.

**Methods:** Literature and guideline reviews were performed to glean curriculum content, supplemented with themes identified among patients and clinicians. Semistructured interviews were conducted with homebound patients regarding their perspectives on living with cardiovascular disease and focus groups were held with home care clinicians regarding their perspectives on caring for these patients. Transcripts were analyzed with the constant comparative method. A 15-item questionnaire was administered to home care nurses and rehabilitation therapists pre- and post-training, and responses were analyzed using a paired sample *t* test.

**Results:** Three themes emerged among patients: (1) awareness of heart disease; (2) motivation and caregivers' importance; and (3) barriers to attendance at outpatient CR; and 2 additional themes among clinicians: (4) gaps in care transitions; and (5) educational needs. Questionnaire results demonstrated significantly increased knowledge posttraining compared with pretraining among home care clinicians (pretest mean = 12.81; posttest mean = 14.63,  $P < .001$ ). There was no significant difference between scores for nurses and rehabilitation therapists.

**Conclusions:** Home care clinicians respond well to an adapted CR training to improve care for homebound patients with cardiovascular disease. Clinicians who participated in the training demonstrated an increase in their knowledge and skills of the core competencies for CR.

**Key Words:** cardiac rehabilitation • cardiovascular nursing • home care services • patient engagement • physical therapy techniques

Cardiovascular disease (CVD) remains the leading cause of death in the United States, with more than 2150 deaths daily.<sup>1,2</sup> However, significant advances in health care have led to an increase in the number of individuals living

with CVD.<sup>3</sup> These individuals may struggle with self-management and debilitating symptoms, and many patients with CVD discharged from the hospital are readmitted within 30 days.<sup>4,6</sup> Poor dietary habits and physical inactivity are common modifiable risk factors for patients with CVD.<sup>7</sup> CVD is particularly common among the home care population; heart failure (HF) and acute myocardial infarction/ischemic heart disease are leading conditions among home care patients.<sup>5</sup> Homebound patients with CVD are particularly vulnerable to poor outcomes due to their advanced age, functional deficits, multiple comorbidities, and polypharmacy.<sup>8,9</sup>

Improving patient care through secondary prevention of CVD posthospitalization is an opportunity for outcome improvement and impact.<sup>10</sup> Home care clinicians are often the first line of rehabilitation and support for patients posthospitalization. Home-based cardiovascular rehabilitation (CR) models represent a promising approach to improving care and reducing hospital readmissions among patients with CVD.

CR can reduce all-cause mortality and cardiac mortality rates, and benefit patients through exercise and modifications of controllable risk factors.<sup>11</sup> Despite the clinical effectiveness of CR, participation rates remain low. Only 13.9% of acute myocardial infarction patients and 31.0% of coronary artery bypass graft surgery patients attend CR posthospitalization.<sup>12</sup> Cardiac patients with Medicare may qualify for a 60-day episode of home care if they are deemed "homebound," meaning unable to leave home unassisted.<sup>13</sup> However, skilled home care services do not typically include standardized cardiac rehabilitative care. The average time from hospital discharge to outpatient CR enrollment is approximately 35 days, resulting in a gap in specialized cardiac care for patients when functional decline and uncontrolled symptoms can occur.<sup>14,15</sup> There is a need for alternate models of secondary preventative cardiac care to fill this gap and prevent poor outcomes.

Home-based and center-based CR programs have proven to be equally effective in improving clinical outcomes and health-related quality of life, with improved adherence

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among home-based participants.<sup>16,17</sup> Although home-based programs are potentially an effective and low-cost method of care,<sup>18</sup> most home care agencies have yet to integrate the core competencies of CR programs into their practices due to a lack of reimbursement mechanisms and the challenges associated with designing a model within the scope of a typical home care episode.

Professionals providing CR and secondary prevention require the knowledge and skills of the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) core competencies: patient assessment; nutritional counseling; weight, blood pressure, lipid, and diabetes management; tobacco cessation; psychosocial management; physical activity counseling; and exercise training evaluation.<sup>19</sup> Home care clinicians may require additional training in these competencies, as they may not have sufficient evidence-based knowledge of CVD principles and management.<sup>20,21</sup> The purpose of our training was to educate clinicians on the core competencies of CR professionals, adapted for the home care setting. This study reports the development and implementation of a CR training program adapted for home care clinicians, which incorporated the viewpoints of homebound patients with CVD.

## METHODS

The Figure illustrates the curriculum development process and training implementation for this project. The training curriculum was based on the AACVPR core competencies, supplemented through interdisciplinary workgroup meetings, literature and clinical guideline reviews, and interviews and focus groups with patients and home care clinicians, respectively. Outpatient CR professionals contributed to the curriculum design as well. A pretest/posttest design was used to evaluate knowledge among home care clinicians participating in the training. Project protocols were approved by the Visiting Nurse Service of New York Institutional Review Board.

### RECRUITMENT

#### Patients

Medicare patients were eligible for recruitment with a recent admission to home care and an *International Classification of Diseases, Ninth Revision* diagnosis code(s) for HF, atrial fibrillation, coronary artery disease, or myocardial infarction. We recognize that atrial fibrillation is an atypical diagnosis for inclusion in CR. Atrial fibrillation was

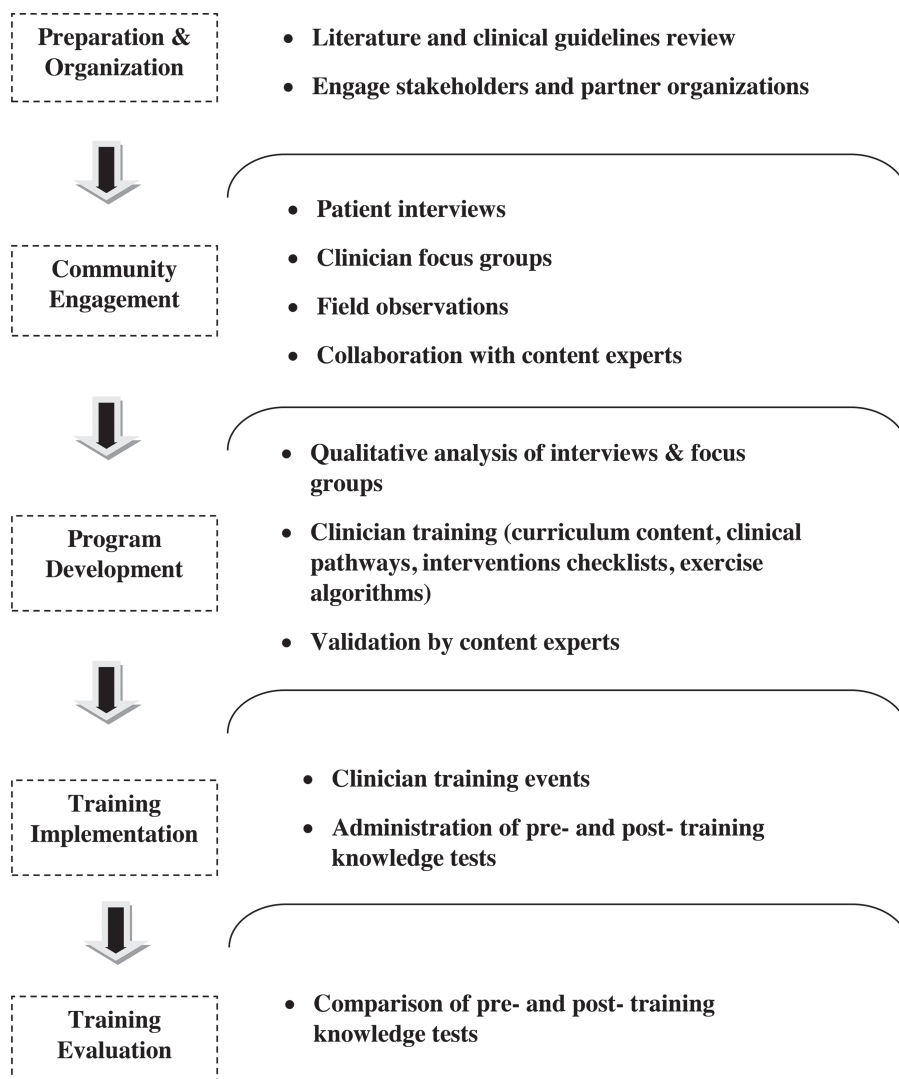


Figure. Process map for the development of the training program.

included due to the high volume of home care patients with cardiac dysrhythmias,<sup>6</sup> and the potential benefits of physical activity with this population.<sup>22,23</sup> Nine patients were selected on the basis of their geographic location and were contacted through their registered nurse (RN) or physical therapist (PT) via telephone.

### **Clinicians**

Interdisciplinary teams had a total of 54 clinicians, composed of RNs, PTs, and occupational therapists (OTs), who participated in the training and corresponding knowledge tests. An invitation was sent prior to the training to solicit participation in the focus groups.

## **DATA COLLECTION**

### **Patients**

Interview sessions averaged 45 minutes and were conducted in patients' homes. Patients were asked about their health status, goals, willingness to make lifestyle changes, sources of health information, and barriers to self-management.

### **Clinicians**

Focus groups averaged 30 minutes, including 2 focus groups with RNs (4-7 per group) and 2 focus groups of PTs and OTs (3-5 per group). Home care clinicians were asked about their experiences caring for patients with CVD, including facilitators and barriers to patient self-management and educational needs.

A 15-item pre- and posttraining knowledge test was created to assess comprehension of training content and CR services (Table 1) and included select questions from the following tools: *Nurses' Knowledge of Heart Failure Education Principles Survey*, *Coronary Artery Disease Education Questionnaire (CADE- Q II)*, and *Heart Disease Knowledge Questionnaire*. These tools are useful in identifying gaps in knowledge regarding HF management, and assessing knowledge of CVD management and CR.<sup>24-29</sup> Items were selected to represent the newest material for the clinicians. Knowledge of traditional components of CR that were not tested in the knowledge tests, such as determining target heart rates, had been previously part of the clinicians' education and practice. Although the training reinforced and standardized these components, the tests were designed to evaluate concepts that were newly reinforced in the training.

## **DATA ANALYSIS**

### **Interviews and Focus Groups**

Recordings of the interviews and focus groups were transcribed. Transcripts were analyzed independently by 3 authors using the constant comparative method to identify common themes.<sup>30</sup> Each researcher individually read and coded the transcripts, then grouped codes to form categories. The authors returned to the data to confirm the frequency of codes, then presented categories as a group to finalize themes.

### **Knowledge Test**

Clinicians' knowledge of CVD was compared before and after implementation of the training program. A paired sample *t* test was used to compare pre- and posttest results and assess for statistical significance ( $P < .05$ ). Data were analyzed using R version 3.1.3.<sup>31</sup>

### **Training Content**

Two 4-hour training sessions were held and the adapted CR curriculum was taught to home care clinicians (Table 2).

These sessions were led by an exercise physiologist with expertise in outpatient CR and home care, a registered dietitian, 2 nurse practitioners specializing in cardiovascular care, and the program director. Both sessions reviewed the same content and materials, and were recorded and transcribed.

## **RESULTS**

### **SAMPLE CHARACTERISTICS**

#### **Patients**

Nine patients (67% male) participated in interviews and ranged in age from 68 to 91 years (mean age = 85 years). The primary cardiac diagnoses for these patients included HF ( $n = 5$ ), coronary artery disease ( $n = 2$ ), myocardial infarction ( $n = 1$ ), and atrial fibrillation ( $n = 1$ ). Number of medications prescribed ranged from 4 to 29 (mean = 12). Self-reported race/ethnicity was 78% ( $n = 7$ ) and 22% ( $n = 2$ ) white and Asian, respectively.

#### **Clinicians**

Fifty-four clinicians (RNs = 25; PTs = 24; OTs = 5) participated in the training, of those 46 (67% female) provided informed consent to participate in research activities. Demographic information was collected from agency records. Clinicians ranged in age from 28 to 64 years (mean = 45 years), with 5 months to 32 years (mean = 10 years) of experience working at the home care agency. Nineteen clinicians (RNs = 11; PTs/OTs = 8) volunteered to participate in focus groups. Forty-one clinicians (RNs = 16; PTs = 20; OTs = 5) completed the knowledge tests.

### **FINDINGS FROM PATIENT INTERVIEWS**

#### **Awareness of Heart Disease**

Patients lacked awareness about their condition and frequently denied having heart disease. When asked about their heart disease, patients did not talk about symptoms of their disease, but responded with a description of their feelings related to pain or breathing difficulties (eg, "[I was] feeling ill [and having trouble breathing] and didn't know [why], so I went to the hospital.>").

Patients often did not recognize feelings of discomfort as a symptom of their disease. However, when patients denied experiencing feelings of discomfort, they connected this lack of feelings with not having a heart problem. When asked about his heart condition, a patient explained, "[my heart] is quiet. I do not feel anything". Many patients were uncertain about the cause of their hospital encounter. When asked about their hospital stay, patients spoke about the feeling that brought them into the hospital, such as breathing problems or syncope, but few connected these feelings to CVD. Patients expressed confusion about their discharge instructions and what to do at home after their hospital stay.

#### **Motivation and Caregivers' Importance**

Patients described fluctuating levels of motivation. Those who expressed a limited willingness to change felt they had been caring for themselves a certain way for years and were apprehensive about learning new information (eg, "do not tell me anything and I do not worry about it"). Other patients demonstrated higher motivation levels to improve their health, expressing optimism and willingness to follow their provider's instructions. A common motivator for improving health was to spend more time with their families. Patients also relied on family members as their source of health information and to inquire when something was wrong (eg, "I will talk to my daughter and her husband. He is not a doctor but he is very smart").

**Table 1**

**Knowledge Test Administered to Clinicians Pre- and Posttraining**

| <b>Section 1: True or False Questions</b>  |  | <b>Correct Answer</b> |                       |
|--|--|-----------------------|-----------------------|
| 1. Most people can tell whether or not they have high blood pressure   |  | False                 |                       |
| 2. Polyunsaturated fats are healthier for the heart compared with saturated fats   |  | True                  |                       |
| 3. Dietary fiber lowers blood cholesterol  |  | True                  |                       |
| 4. Heart disease is better defined as a short-term illness than a chronic, long-term illness   |  | False                 |                       |
| 5. If a patient wakes up at night with difficulty breathing, and the breathing difficulty is relieved by getting out of bed and moving around, this does not mean the heart failure condition has worsened |  | False                 |                       |
| 6. Lean deli meats are an acceptable food choice as part of the heart failure patient's diet   |  | False                 |                       |
| <b>Section 2: Multiple-Choice Questions</b>  |  | <b>Correct Answer</b> | <b>Partial Answer</b> |
| 7. What is one good way to add more fiber in your diet?  |  | C                     | A                     |
| A. Add nuts and seeds to a salad   |  |                       |                       |
| B. Drink juice   |  |                       |                       |
| C. Eat plant proteins (eg, legumes/beans and lentils)  |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 8. What are the important parts of an exercise prescription?   |  | B                     | C                     |
| A. Replacing calories and salt during a light workout  |  |                       |                       |
| B. How hard to exercise, how long to exercise, how often to exercise, and what type of exercise to do  |  |                       |                       |
| C. How hard to exercise and how long to exercise   |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 9. The "statin" medications, such as atorvastatin (Lipitor), rosuvastatin (Crestor), or simvastatin (Zocor), have a beneficial effect in the body by:  |  | B                     | A                     |
| A. Lowering LDL cholesterol in the bloodstream   |  |                       |                       |
| B. Blocking the production of LDL cholesterol in the liver, lowering LDL cholesterol in the bloodstream, and encouraging cholesterol to move out of plaques from the arteries                              |  |                       |                       |
| C. Reducing the absorption of cholesterol from food  |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 10. In a person with CAD, which of the following is a usual description of angina?   |  | B                     | C                     |
| A. Headache after meals  |  |                       |                       |
| B. Chest pain or discomfort, at rest or during physical activity, which can also be felt in the arm and/or back and/or neck  |  |                       |                       |
| C. Chest pain or discomfort during physical activity   |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 11. How does a person know whether he/she is exercising at the right level?  |  | A                     | B                     |
| A. The heart rate is in the target zone, the exertion level is no higher than "somewhat hard," and the person can exercise and talk  |  |                       |                       |
| B. The heart rate is in the target zone  |  |                       |                       |
| C. Working up a sweat, breathing heavy, and the heart rate is going fast.  |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 12. Angina is:   |  | B                     | A                     |
| A. When the heart muscle is working too hard   |  |                       |                       |
| B. When the heart muscle is not getting enough blood and oxygen to work properly   |  |                       |                       |
| C. When the brain is not getting enough oxygen   |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 13. A heart attack occurs:   |  | C                     | A                     |
| A. If an artery in the heart becomes blocked   |  |                       |                       |
| B. If the heart suddenly races in response to stress   |  |                       |                       |
| C. If the flow of oxygen-rich blood to an area of heart muscle suddenly becomes blocked. If blood flow is not restored quickly, the area of heart muscle begins to die                                     |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 14. The benefits of resistance training (lift weights or elastic bands) include  |  | C                     | A                     |
| A. Builds up strength and muscles  |  |                       |                       |
| B. Lowers resting heart rate   |  |                       |                       |
| C. Increases strength, improves the ability to carry out day-to-day activities, improves blood glucose levels, and increases muscle  |  |                       |                       |
| D. I do not know   |  |                       |                       |
| 15. CAD is   |  | C                     | B                     |
| A. A disease of the heart's arteries that occurs only in older age and is mainly caused by deposits of calcium in the arteries   |  |                       |                       |
| B. A disease of the arteries of the heart that occurs in older age in people with high cholesterol or who smoke  |  |                       |                       |
| C. A disease of the arteries of the heart that starts silently at a young age. It is influenced by poor lifestyle habits, genetics, and involves inflammation in the arteries                              |  |                       |                       |
| D. I do not know   |  |                       |                       |

Abbreviations: CAD, coronary artery disease; LDL, low-density lipoprotein.

Table 2

## Overview of the Clinician Training Curriculum

| Section                                 | Examples of Content   |
|---|---|
| Background on Cardiac Rehabilitation    | <ul style="list-style-type: none"> <li>• Cardiac rehabilitation overview</li> <li>• American Association of Cardiovascular and Pulmonary Rehabilitation Core Competencies for Cardiac Rehabilitation</li> <li>• Continuum of cardiac care and the gaps within</li> <li>• Literature review of alternate models and home-based trials</li> </ul>   |
| Home Heart Health Program Overview      | <ul style="list-style-type: none"> <li>• Standardized model and program goals</li> <li>• Strategies for development and implementation</li> <li>• Program and professional competencies</li> <li>• Behavioral change, motivational interviewing</li> <li>• Caregiver engagement and the teach-back method</li> </ul>  |
| Exercise Physiology                     | <ul style="list-style-type: none"> <li>• Cardiac output, maximum oxygen uptake, and metabolic equivalent levels</li> <li>• Literature review of low intensity exercise</li> <li>• Using an exercise prescription: FITT equation and exercise algorithm for patient progression</li> <li>• Standardized protocol for 2-minute walk test</li> <li>• Energy conservation and breathing strategies</li> <li>• Review of cardiac devices</li> <li>• "Beyond the treadmill"—resistance and strengthening, static and dynamic balance, flexibility and stretching</li> </ul> |
| Nutrition                               | <ul style="list-style-type: none"> <li>• Basic food groups, nutrient facts, and food labels</li> <li>• Create your plate</li> <li>• Risk factor focus—specific nutrients to focus on based on patient's cardiac risk factors</li> <li>• Fluids and fluid restrictions</li> <li>• Practical strategies for patients</li> </ul>   |
| Risk Factors for Cardiovascular Disease | <ul style="list-style-type: none"> <li>• Review of common cardiovascular diagnoses and procedures</li> <li>• Risk factors: review, assessment, interventions, outcomes, goals <ul style="list-style-type: none"> <li>◦ Weight management; blood pressure management; lipid management; diabetes management; tobacco cessation; psychosocial management</li> </ul> </li> <li>• Emergency action plan</li> </ul>  |
| Application to Practice                 | <ul style="list-style-type: none"> <li>• Workflow and documentation</li> <li>• Interdisciplinary collaboration and connecting with providers</li> <li>• Program resources and materials</li> <li>• Clinical pathway and visit interventions checklist</li> <li>• Case studies and takeaway points</li> </ul>  |

Abbreviation: FITT, frequency, intensity, time, and type.

### Barriers to Attendance at Outpatient CR

Patients described a functional decline when they returned home from the hospital and the challenges of regaining their strength (eg, "If you are in the hospital, you deteriorate physically. I need to be able to get back to normal."). Despite rehabilitative progress during home care, patients expressed challenges with continuing their exercises independently. A patient explained that when he receives home care physical therapy, "[The PT] gives me some exercises. My problem is continuing after he's left." Furthermore, patients indicated a lack of awareness of outpatient services and resources available when discharged from home care services. Only 1 patient was familiar with CR services, but he reported feeling too weak to attend.

### FINDINGS FROM CLINICIAN FOCUS GROUPS

#### Patient Awareness of Heart Disease

Clinicians reaffirmed patients' lack of awareness about their disease by explaining patients "don't realize their diagnosis. They complain of this and that, but they do not realize it's under the conditions of having CHF." A rehabilitation therapist illustrated that patients believe "[having a diagnosis of] heart failure means [that you are] dying." Clinicians verified the need for further education for patients, stating that patients often lack information about how to modify their diets, such as identifying low-sodium foods. A nurse explained that patients receive "a long list of things that they shouldn't eat, but are never really told what they can eat."

#### Motivation and Caregivers' Importance

The clinicians reported varying motivation levels and goal-setting strategies among patients. Clinicians described patients who expressed optimism about their care and condition, but also patients who appear unmotivated to change their habits. One rehabilitation therapist quoted a patient who said, "What do you expect from me? I'm 92 years old." Another nurse explained, "[patients] want to continue eating what they're eating and doing what they're doing". Clinicians felt patients were content in their habits and did not want to make lifestyle changes, such as monitoring their weight daily. One strategy used by clinicians was setting simple and affirmative goals with patients, such as walking to the mailbox daily. Clinicians also emphasized the importance of involving family caregivers in patient goal-setting, as a strategy for increasing patient compliance (eg, "I felt like I [made more progress with the patient] when his son was there versus when I saw [the patient] by myself"). They discussed that patients often rely on caregivers for an understanding of their health and to make decisions about their condition.

#### Barriers to Attendance at Outpatient CR

Clinicians who were familiar with outpatient CR identified barriers to patient attendance. They illustrated that patients were not aware of available resources, and lacked transportation to facilities or access to programs near their homes. A nurse stated, "Patients really want to go [to cardiac rehabilitation] but when I explain [to the patient that he] can't



**Table 3**

**Examples of Quotes to Illustrate Patient and Clinician Themes**

| Theme   | Quotes  |
|---|---|
| <b>Patients</b>   |   |
| Awareness of heart disease                                  | When I was in the hospital, they said my heart is very weak but I do not feel any weakness in my heart. I am still alive and breathing [normally]   |
| Motivation and caregivers' importance                       | I haven't the vaguest idea [why I needed a pacemaker]. The doctor was never really clear to me. The whole thing never seemed necessary. Why do you want to change my heart around?  |
| Barriers to attendance at outpatient cardiac rehabilitation | I would like to live longer and see [my grandson] grow<br>I felt very weak when I got out of the hospital and I knew I couldn't do it. I called and I postponed [outpatient cardiac rehabilitation].  |
| <b>Clinicians</b>   |   |
| Gaps in care transitions                                    | There are some cases where it is so hard to get the physician on the phone, and we do not know what to do with the patient. Should they take their medication today or hold off if their blood pressure is too low?   |
| Educational needs   | With these patients, we need clear guidelines. When [the discharge papers] state "do not let blood pressure get under or over [a certain number]," you have a good idea when you're beating the alarm. Unfortunately we [often] do not [have that information]. |

have a nurse at home and go there, [the patient says] 'how will I get there. Will you get me there?'. Rehabilitation therapists also identified transportation and geographic barriers to patient attendance at outpatient CR programs, "We usually recommend [patients] go to cardiac rehabilitation after home care. The problem with cardiac rehabilitation is often [the patient] is on the east side and [cardiac rehabilitation] is on the west side."

**Gaps in Care Transitions**

Clinicians identified gaps in care transitions between the hospital and home care setting. Clinicians often lacked information about the patient's hospitalization and prior functioning. Without further knowledge of their patients' conditions and discharge instructions, rehabilitation therapists were hesitant to "push" patients when exercising. Clinicians expressed challenges with connecting with provider(s) to coordinate treatment plans. The rehabilitation therapists explained that when they call a provider with questions for cardiac patients, they need a response "right then and there, otherwise we have to send the patient to the emergency room, which no one is happy about." Clinicians lack the support needed to make autonomous decisions in the home without standardized guidelines and contact with providers.

**Educational Needs**

Although some clinicians acknowledged CR, others expressed an uncertainty or said they "do not know what cardiac rehab is." One misconception held by some clinicians was that CR is designed for younger patients, but is not appropriate for the elderly. Clinicians demonstrated a need for further education about assessments and interventions for cardiac patients, such as caring for a patient with a cardiac device. Rehabilitation therapists explained they wanted more information on the followup procedures and

how to identify when there was a problem with these devices, such as ventricular assist devices. They also expressed the need for "specific protocols of increasing [activity] load, with cardiovascular training or weight training" to complement their knowledge from experience. Examples of quotations from patients and clinicians illustrating patient and clinician themes are provided in Table 3.

**FINDINGS FROM CLINICIAN PRE- AND POSTTRAINING KNOWLEDGE TEST**

Paired sample *t* tests revealed significant differences pre- and posttraining in clinicians' knowledge of cardiovascular conditions and rehabilitation. Pretraining knowledge test scores did not differ significantly between RNs (n = 16) and PTs/OTs (n = 25) participating in the training (RN mean score = 13.04; PT/OT mean score = 12.66). Posttraining knowledge test scores improved an average of 1.8 points out of a total possible score of 15 points (pretraining and posttraining mean scores = 12.81 and 14.63, respectively; *P* < .001). Separate *t* tests for each clinical discipline demonstrated significantly greater knowledge (RNs and PTs/OTs both *P* < .001) posttraining compared with pretraining (Table 4). There was no significant difference observed in posttraining knowledge scores by discipline (posttraining mean scores for RNs and PTs/OTs were 14.72 and 14.56, respectively).

**DISCUSSION**

There is limited research on the delivery of CR services to homebound patients with CVD. After an extensive literature review and synthesis of qualitative findings, we developed an adapted CR training program based on the AACVPR guidelines for clinicians providing care to homebound patients. Training was provided to RNs, PTs, and

**Table 4**

**Paired Sample *t* Test Comparing Clinicians' Pre- and Posttraining Knowledge Test Scores**

|                                   | Pretest | Posttest | Mean Difference ± SD | 95% CI    | <i>P</i> Value |
|-----------------------------------|---------|----------|----------------------|-----------|----------------|
| All clinicians, n = 41            | 12.81   | 14.63    | 1.81 ± 1.42          | 1.37-2.27 | <.001          |
| Nurses, n = 16                    | 13.04   | 14.73    | 1.69 ± 1.73          | 0.77-2.61 | .001           |
| Rehabilitation Therapists, n = 25 | 12.66   | 14.56    | 1.90 ± 1.22          | 1.39-2.40 | <.001          |

Abbreviation: SD, standard deviation.

Pre- and posttraining knowledge test scores are mean values calculated out of a total of 15 points.

OTs at a certified home health agency with a comprehensive overview of CR, emphasizing exercise physiology, nutrition counseling, and CVD risk factor reduction. The training attempted to address knowledge gaps identified among clinicians and patients, which led us to develop specific protocols for progressing patients and intervention checklists for home care visits. The pre- and posttraining knowledge test scores demonstrated significant improvements in clinicians' knowledge of CVD and CR.

Our findings yielded a lack of awareness among homebound patients regarding CVD and how to self-manage their conditions at home, consistent with the literature emphasizing a lack of awareness of CVD across settings.<sup>32,33</sup> When asked about their heart disease, many patients described their "feelings," such as feeling short of breath. Patients did not connect these "feelings" with symptoms of a condition. To address this lack of awareness among patients, clinicians were educated on interactive education strategies, such as the teach-back method.<sup>34</sup> Transitional care practices that encourage patients to take an active role in managing their condition have been shown to reduce hospitalization rates.<sup>35,36</sup>

Both patients and clinicians demonstrated a lack of awareness of CR and its purpose, consistent with prior literature correlating a lack of knowledge about CR with low participation rates.<sup>37</sup> There is limited time to discuss CR with hospitalized patients and to coordinate referrals, highlighting the importance of educating home care clinicians on these programs.<sup>38</sup> The misconception among clinicians that only younger patients may benefit from CR reinforced the need for further education about eligibility criteria. Furthermore, the limited number of outpatient CR centers near patients' homes poses an additional barrier, especially for older home care patients, and represents a predictor of attendance at outpatient CR.<sup>39,40</sup> The development of CR programs adapted for the home care setting may help patients overcome these barriers and aid homebound patients in receiving CR services.

Our training integrated interprofessional education to train RNs, PTs, and OTs to function as an interdisciplinary team of CR specialists.<sup>41</sup> Disciplines were educated to reinforce interventions to increase patient adherence to lifestyle changes. The results from the pre- and posttraining knowledge tests did not differ significantly between nurses and rehabilitation therapists, indicating the effectiveness of collaborative education for nurses and rehabilitation therapists.

We recommend future studies include interviews or focus groups with patients and clinicians before developing educational training. Engaging clinicians beforehand allowed us to obtain baseline knowledge and assess deficits to tailor the training to the individual needs of our clinicians. As we deduced from the focus groups, clinicians would benefit from standardized cardiac care plans with exercise protocols, to help identify how and when to progress patients, and how to safely monitor their responses. Feedback illustrating the need for education on cardiac devices influenced us to include a review of cardiac devices in the curriculum. We incorporated a behavioral change section into the training, including an overview of behavioral change strategies and motivational interviewing, to address the challenges described with motivation and goal-setting.<sup>42</sup>

To ensure operational feasibility, we focused on restructuring and improving care based on clinicians' practice and regulations within the current model of home care. The synergy among patient and clinician themes demonstrated a need for further education for both parties. The training increased knowledge among clinicians with the potential to empower patients and address patients' educational needs.

This study represents the first phase of a larger initiative to implement and evaluate the feasibility of delivering CR services to homebound patients in a certified home health agency. Next steps will be to assess clinician fidelity to program interventions and feasibility by tracking patients who were enrolled in the home-based CR pilot program.

A limitation of the study is that the small patient and clinicians samples were taken from 1 home health agency in New York, and patients were predominantly white and male, limiting generalizability. Second, without obtaining the characteristics of the 13 clinicians who chose not to share their data, there is a risk of clinician bias in the training evaluation. Third, the restricted amount of time to conduct the training limited the information included in the curriculum. Despite these limitations, there was evidence to support the need for further implementation and evaluation of training on the core competencies of CR for home care clinicians.

## CONCLUSIONS

Home-based CR programs may help address the gap in care between hospital discharge and traditional outpatient CR. For patients with HF enrolled in Medicare, who must wait 6 weeks before being eligible for outpatient participation, a home-based CR program provides a head-start. Furthermore, many other patients may never have access to or the ability to attend an outpatient facility. Home-based CR programs may help provide the education and motivation these patients need to better self-manage their chronic disease. This project will contribute additional data to addressing the feasibility of implementing a home-based CR model within the structure of a home care agency.

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