Clinical Exercise Physiologists in Cardiac Rehabilitation and Clinical Exercise Testing

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ABSTRACT

Background: The unique training of clinical exercise physiologists (CEPs) positions them to be an integral part of multidisciplinary teams in phase 2 cardiac rehabilitation (CR). However, the roles and responsibilities of CEPs vary widely between institutions. In addition, job tasks of CEPs at some institutions might not fully leverage their knowledge and skills. The purpose of this study was to describe the roles and responsibilities of CEPs working in CR and noninvasive clinical exercise testing at select institutions in the United States.

Methods: This was a descriptive study of the job tasks performed by CEPs in CR and noninvasive clinical exercise testing at select institutions. Job tasks that are common to CR and noninvasive clinical exercise testing were identified by a working group of the Clinical Exercise Physiology Association.

Results: The 6 CR programs in this report are predominately staffed by CEPs with no other health care professional present during exercise classes. In 5 of these programs CEPs perform all tasks required of phase 2 CR, from patient screening to program discharge. At 3 of the 4 programs that also performed noninvasive exercise testing, CEPs performed all the necessary tasks with no other health care professional present in the room during testing.

Conclusion: CEPs play an integral role in the conduct of phase 2 CR and noninvasive cardiology exercise testing. Granting privileges to CEPs that allow them to work at the top of their knowledge and skills will allow other health care professionals to better use their skills in other high demand areas. *J Clin Exerc Physiol*. 2023;12(2):38–45.

Keywords: privileges, profession, roles, responsibilities, staffing

INTRODUCTION

Clinical exercise physiologists (CEPs) are allied health professionals who are academically and clinically trained to evaluate acute and chronic responses to exercise in apparently healthy individuals and those with chronic disease, and to implement behavior change techniques to promote adherence to healthy lifestyles (1–3). This unique training positions CEPs to be an integral part of multidisciplinary teams in phase 2 cardiac rehabilitation (CR) programs. However, the roles and responsibilities of CEPs vary widely between institutions. In addition, anecdotal evidence suggests the job tasks of some CEPs are limited and do not fully leverage their unique knowledge and skills.

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Conflicts of Interest and Source of Funding: The authors have no conflicts or funding sources to report.

Based on data of Medicare beneficiaries, during 2017 just 29% of eligible patients with heart disease participated in at least 1 session of CR in the United States (4). Through the Million Hearts initiative, the Centers for Disease Control and Prevention and the Centers for Medicare & Medicaid Services aim to increase CR participation to 70% (5). Movement toward this goal will necessitate a dramatic increase in the current capacity of CR programs (6) which will require additional appropriately trained staff. Considering the chronic nursing shortage (7,8), CEPs are ideally suited to fill this CR staffing gap. However, there may be reservations at some institutions to employ and/or expand the roles of CEPs because of uncertainty in their knowledge and skills, and uncertainty of the job tasks they can perform. Therefore, the purpose of this study was to describe the roles and responsibilities of CEPs working in CR at select institutions in the United States.

METHODS

In response to frequent member inquiries for a defined scope of practice for CEPs, in 2021 the Clinical Exercise Physiology Association (CEPA) convened an ad hoc working group to address these requests. Select CEPs (see author list) from academia and health care in the United States were invited to serve. Each of these individuals is actively working in a clinical setting as a CEP or did so previously. In addition, the Director of the Committee on Certification and Registry Boards from the American College of Sports Medicine (ACSM) was invited to serve as an ex officio (nonvoting) member.

For many individuals, "scope of practice" can only be defined by legislative action (e.g., a licensure law). As a result, the working group chose to define its efforts as describing the "practice patterns of CEPs." Because 69% of CEPs in the United States work in CR and/or noninvasive cardiology exercise testing laboratories (9), the group chose to focus initial efforts on these areas. The working group defined a CEP as an individual with a bachelor's degree or higher in exercise science/physiology and at least minimal clinical experience (e.g., completed a clinical internship).

The working group established 4 key objectives (Table 1) and designed a 2-stage process to accomplish them. In stage 1 the group identified job tasks that are common to phase 2 CR and noninvasive clinical exercise testing. Whether CEPs are responsible for each of these job tasks at the institutions represented by the working group are presented herein. In stage 2 a survey will be distributed to CR program managers across the United States. The goal of stage 2 will be to describe the frequency of programs that staff CEPs in a manner that allows these clinicians to maximally use their unique knowledge and skills in CR programs in the United States.

Phase 2 CR is a physician-prescribed, medically supervised, secondary prevention program for patients who have experienced a cardiac event, including coronary revascularization, myocardial infarction, chronic stable angina, heart valve replacement/repair, systolic heart failure, or cardiac transplant (10). It is an outpatient program that is typically offered in a hospital-based setting but may be offered in ambulatory facilities or satellite outpatient centers. Most CR programs are administered in a group setting and include individualized patient programming. A core component of CR is 2 to 3 days per week of moderate to vigorous aerobic exercise training, which might include electrocardiographic telemetry monitoring. While select states may have legislation that require the inclusion of a specific professional in the delivery of CR (e.g., Massachusetts), there is no nationally mandated staffing requirement outside of a physician medical director (11). Many programs use a multidisciplinary team that may include CEPs, nurses, and dietitians (12,13).

TABLE 1. Key objectives of the CEP practice patterns working group.

1.	Describe staffing models used in cardiac rehabilitation programs and clinical exercise testing laboratories.
2.	Describe the criteria used to define a CEP (e.g., education, internship, certification).
3.	Describe the roles, responsibilities, and level of autonomy of CEPs in cardiac rehabilitation and clinical exercise testing laboratories relative to patient screening, medication reconciliation, physician orders, monitoring during exercise, individual treatment plans, patient education, symptom assessment, and the administration of oxygen, nitroglycerin, and aspirin.
4.	Describe the emerging roles of CEPs in telehealth cardiac rehabilitation.

CEP = clinical exercise physiologist

In noninvasive cardiology exercise testing laboratories, staff perform sign and symptom-limited maximal exercise stress tests on patients at risk for or with known heart disease who have been referred by a physician. Symptoms, heart rate, blood pressure, and the electrocardiogram are monitored before, during, and after the patient performs an exercise protocol that progresses them from a low exercise intensity (e.g., slow walking on a treadmill) up to a maximal effort. The American Heart Association has published standards for the conduct of these tests (14,15) and a statement supporting the competency of CEPs to administer these tests without a physician (16).

RESULTS

The institutions included in this report are from various regions within the United States, including the Midwest, North Central, Northeast, and the Northwest. Hiring requirements of CEPs to work in phase 2 CR at the institutions in this report are shown in Table 2. All programs require candidates to have a degree in exercise science/physiology. They also require or prefer candidates to have completed a clinical internship experience and pass ACSM's Clinical Exercise Physiologist certification.

Roles and responsibilities of CEPs in CR at the 6 institutions are shown in Table 3. Each of these CR programs are predominately staffed by CEPs with no other allied health

TABLE 2. Hiring requirements for clinical exercise physiologists working in phase 2 cardiac rehabilitation at select institutions.

Institution (State)	Staff Title	Minimum Degree	Clinical Internship	ACSM-CEP Certification	Other Required Certifications
CHI SA (North Dakota)	Exercise Physiologist	Bachelor's	600 hours (preferred)	Preferred	BLS (before hire) ACLS (after hire)
HFHMG (Michigan)	Exercise Physiologist	Bachelor's	600 hours	Preferred	BLS (before hire) ACLS (after hire)
OHVI (Oregon)	Exercise Specialist	Bachelor's	600 hours (preferred)	Preferred	BLS (before hire)
	Clinical Exercise Physiologist	Master's (preferred)		Required	BLS (before hire) ACLS (after hire)
U of IL-C (Illinois)	Clinical Exercise Physiologist	Master's	600 hours (preferred)	Preferred	BLS (before hire)
U-M Health (Michigan)	Clinical Exercise Physiologist	Bachelor's	600 hours (preferred)	Required within 1 year of hire	BLS (before hire) ACLS (after hire)
U of VT Health (Vermont)	Exercise Physiologist	Master's	600 hours	Preferred	BLS (before hire) ACLS (after hire) CCRP (after hire)

ACLS = advanced cardiac life support; ACSM-CEP = American College of Sports Medicine Clinical Exercise Physiologist; BLS = basic life support; CCRP = certified cardiac rehabilitation professional; CHI SA = CHI St. Alexius Health; HFHMG = Henry Ford Hospital & Medical Group; OHVI = Oregon Heart & Vascular Institute; U of IL-C = University of Illinois at Chicago; U-M Health = University of Michigan Health System: Michigan Medicine; U of VT Health = The University of Vermont Health Network

professional (e.g., nurse, physical therapist) present during exercise classes. CEPs are trained to assess lung sounds at 2 of these programs. This task is not part of standard procedures at the other 4 programs. Nurses are an interdisciplinary part of the CR staffing at 2 of the programs, with 1 of those programs requiring nursing staff because of an institutional agreement with the local nursing union. However, all duties performed by nurses in that program are equally performed by CEPs. All clinical/regulatory documentation, such as individual treatment plans and signing daily encounters are performed by CEPs at each of the institutions represented in this report. Additional programs offered at these sites (not inclusive of all sites) that are also staffed by CEPs include phase 1 (inpatient) CR, phase 3 (maintenance) CR, telehealth CR, supervised exercise training for patients with peripheral arterial disease, pulmonary rehabilitation, exercise rehabilitation for patients diagnosed with cancer, clinical weight management, and clinical research.

The roles and responsibilities of CEPs in noninvasive cardiology exercise testing laboratories at 4 of the institutions are shown in Table 4. At 3 institutions, CEPs are the primary administrator of maximal exercise tests making informed decisions on the appropriateness to start a test and when a test should be stopped, with no other health care professional nor physician present in the room during testing. At the remaining institution (The University of Vermont Health Network) a nurse or physician is present to supervise the test and to interpret the results, but all other duties are performed by a CEP.

DISCUSSION

In this study we described several CR programs and noninvasive cardiology exercise testing laboratories that are staffed exclusively by CEPs. In those programs that are also staffed with other health care professionals, CEPs are responsible for all aspects of the exercise sessions during CR including approval and clearance of patients to exercise, symptom and physiologic assessment, completion of individual treatment plans, and signing daily encounters. These data highlight important commonalities among these institutions relative to CEP practice patterns and demonstrate the scope of duties CEPs are capable of administering (Figure 1). Findings from these institutions reveal that when CEPs are granted privileges permitting them to work at the full extent of their education and training, they can manage and oversee CR programs and maximal exercise testing. Staffing of CEPs allows other health care professionals, such as nurses, to be used in other areas of health care where their knowledge and skills can be better applied (e.g., work at the top of their scope of practice). This is particularly important given nationwide initiatives to enroll more patients into CR (5) and staffing shortages currently experienced in health care (7,8).

There are a few related studies in this area. In a 1999 study of 208 CR programs in the United States (17), 60% reported they employed exercise physiologists (EPs) requiring a minimum of a bachelor's or master's degree. Among programs that staffed EPs, 43% required ACSM certification and 25% encouraged it; 45% required

TABLE 3. Roles and responsibilities of clinical exercise physiologists working in phase 2 cardiac rehabilitation at select institutions.[a]

Roles and Responsibilities	CHI SA	HFHMG	OHVI	U of IL-C	U-M Health	U of VT Health
Screen and enroll patients into program	Yes	Yes	Yes	Yes	No	Yes
Introductory group session (e.g., orientation)	Yes	Yes	Yes	Yes	Yes	Yes
Review medications	Yes	Yes	Yes	Yes	Yes	Yes
Develop exercise prescription	Yes	Yes	Yes	Yes	Yes	Yes
Clear patient for daily exercise	Yes	Yes	Yes	Yes	Yes	Yes
Prep patient for telemetry ECG (as indicated)	Yes	Yes	Yes	Yes	Yes	Yes
Supervise exercise	Yes	Yes	Yes	Yes	Yes	Yes
Adjust exercise workloads	Yes	Yes	Yes	Yes	Yes	Yes
Monitor ECG during exercise	Yes	Yes	Yes	Yes	Yes	Yes
Measure blood pressure through auscultation	Yes	Yes	Yes	Yes	Yes	Yes
Measure blood pressure with doppler	Yes	Yes	Yes	Yes	Yes	NA
Develop individual treatment plan	Yes	Yes	Yes	Yes	Yes	Yes
Complete individual treatment plan reports	Yes	Yes	Yes	Yes	Yes	Yes
Deliver patient education	Yes	Yes	Yes	Yes	Yes	Yes
Assess symptoms	Yes	Yes	Yes	Yes	Yes	Yes
Assess blood glucose	Yes	Yes	Yes	Yes	Yes	Yes
Assess lung sounds	Yes	NA	Yes	NA	NA	NA
Assess extremities for edema	Yes	Yes	Yes	NA	Yes	Yes
Assess pulse oximetry	Yes	Yes	Yes	Yes	Yes	Yes
Administer oxygen (as indicated)	Yes	Yes	Yes	Yes	Yes	Yes
Administer nitroglycerin (as indicated)	Yes	Yes	Yes	Yes	No	Yes
Administer aspirin (as indicated)	Yes	Yes	NA	Yes	No	Yes
Lead BLS with AED	Yes	Yes	Yes	Yes	Yes	Yes
Defibrillate during cardiac arrest	Yes	Yes	Yes	Yes	Yes	Yes
Communicate orders from physician to patient	Yes	Yes	Yes	Yes	Yes	Yes
Sign daily encounters	Yes	Yes	Yes	Yes	Yes	Yes
Discharge patient from program	Yes	Yes	Yes	Yes	Yes	Yes

BLS with AED = basic life support with automated external defibrillator; CHI SA = CHI St. Alexius Health; HFHMG = Henry Ford Hospital & Medical Group; ECG = electrocardiogram; NA = not applicable; OHVI = Oregon Heart & Vascular Institute; U of IL-C = University of Illinois at Chicago; U-M Health = University of Michigan Health System: Michigan Medicine; U of VT Health = The University of Vermont Health Network

[a]Yes means the task is performed by clinical exercise physiologists. No means the task is performed by another health care professional. NA means the task is not part of the standard operating procedures

advanced cardiac life support certification and 41% encouraged it (17). In a 2004 study of 93 CR programs in the Great Lakes region of the United States, 77% employed EPs with a bachelor's or master's degree (18). Among these programs, 24% required a clinical internship prior to being hired (18). In a 2016 study of 33 CR programs in the Mid-Atlantic region of the United States, 73% reported they employed EPs and 45% reported staffing more CEPs than nurses (19). Finally, in a 2022 study of 55 pediatric exercise testing laboratories (93% were in the United States), 56% reported an EP among their staff (20). EPs were the primary staff who conduct the exercise tests in 55% of these laboratories and develop a report of the test results for physician approval in 77% of these laboratories (20). It is important to note that in each of these studies, authors referred to staff as EPs rather than CEPs. Together these data support the importance of collecting contemporary data from a broad sample of CR programs and exercise testing laboratories in the United States. Work on a survey to capture that data is underway by the CEPA working group. In addition, these studies along with the present data highlight the challenge of the various staff titles for clinical exercise professionals (e.g., CEP, EP, exercise specialist) that are used in health care.

TABLE 4. Roles and responsibilities of clinical exercise physiologists in noninvasive cardiology exercise testing laboratories at select institutions.[a]

Characteristics, Roles, and Responsibilities	HFHMG	U of IL-C	U of VT Health	U-M Health
Degree to administer maximal exercise test	Master's/Doctorate	Master's	No	Bachelor's/Master's
Degree to assist with maximal exercise test	Bachelor's/Master's	Bachelor's	Master's	Bachelor's/Master's
Direct physician supervision	No	No	Yes	No
Review medical record and interview patient prior to test	Yes	Yes	Yes	Yes
Review medications	Yes	Yes	Yes	Yes
Prepare patient for 12-lead electrocardiogram	Yes	Yes	Yes	Yes
Measure rest and exercise blood pressure	Yes	Yes	Yes	Yes
Interpret electrocardiogram at rest and during exercise	Yes	Yes	Yes	Yes
Determine appropriateness to start the test	Yes	Yes	Yes	Yes
Select testing protocol	Yes	Yes	Yes	Yes
Determine when to end the test	Yes	Yes	Yes	Yes
Assess symptoms	Yes	Yes	Yes	Yes
Assess pulse oximetry	Yes	Yes	Yes	Yes
Assess extremities for edema	Yes	NA	Yes	Yes
Administer oxygen (as indicated)	Yes	Yes	Yes	Yes
Administer nitroglycerin (as indicated)	Yes	Yes	Yes	No
Administer aspirin (as indicated)	Yes	Yes	Yes	No
Defibrillate during cardiac arrest	Yes	Yes	Yes	Yes
Calibrate metabolic cart	Yes	Yes	Yes	Yes
Perform spirometry	Yes	NA	Yes	Yes
Interpret data from metabolic cart	Yes	Yes	Yes	Yes
Develop preliminary report for the physician to read	Yes	Yes	Yes	Yes

HFHMG = Henry Ford Hospital & Medical Group; NA = not applicable; U of IL-C = University of Illinois at Chicago; U-M Health = University of Michigan Health System: Michigan Medicine; U of VT Health = The University of Vermont Health Network
[a]Yes means the task is performed by clinical exercise physiologists. No means the task is performed by another health care professional. NA means the task is not part of the standard operating procedures

CEPs are health care professionals that apply evidence-based strategies to design, implement and supervise exercise programming for those with chronic diseases, conditions and/or physical limitations (1–3,9,17,21,22). They are qualified to assess, prescribe, and monitor therapeutic exercise and implement lifestyle behavior techniques for the betterment of health (1–3,21,22). The appropriately prepared CEP should possess a minimum of a bachelor's degree in exercise science/physiology with core course work in exercise prescription and programming, clinical exercise testing, electrocardiography, cardiac pharmacology, and health behavior change techniques (1,2). They typically have completed a minimum of 600 hours of supervised internship in a clinical exercise program, often focusing on CR (1,2). In the United States, the pinnacle of CEP training is to pass the Clinical Exercise Physiology certification exam offered by the ACSM (1,2). Unfortunately, there are large variations in academic preparation between educational programs (1,3). However, beginning in 2027, individuals who wish to sit for the ACSM exam will need to graduate from an exercise physiology program that is accredited by the Commission on Accreditation of Allied Health Education Programs (3).

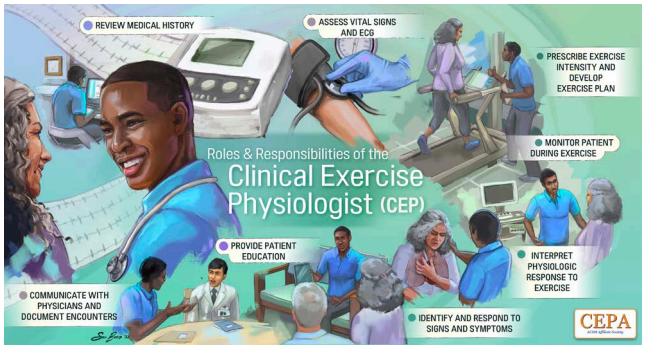

FIGURE 1. Roles and responsibilities of clinical exercise physiologists (CEPs).

The overarching goals of CEP-based services are to (a) manage chronic disease; (b) reduce risk for early development or recurrence of chronic diseases; (c) create lifestyle habits that promote enhancement of health; (d) facilitate the elimination of barriers to habitual lifestyle changes through goal setting and prioritizing; (e) increase activities of daily living; and (f) increase the likelihood of long-term physical, social, and economic independence (2,21). CEPs implement these goals across many settings and populations (e.g., oncology, metabolic disorders, obesity/bariatric surgery), with the largest proportion (59%) of CEPs reporting CR as their primary work setting (9).

Those referred to CR represent the highest risk group of individuals to initiate an exercise training program (23). Along with recently experiencing a cardiac event, defining characteristics of participants in CR are extremely low cardiorespiratory fitness and high rates of obesity, metabolic disease, and chronic comorbid conditions (24). Each of these factors add complexity to the exercise prescription. CEPs are trained to develop and implement safe and effective exercise prescriptions to this complex and challenging group of individuals (2,22).

CR is typically offered in group-based exercise sessions. This contrasts with other physical rehabilitative services, such as physical therapy, which is delivered one-on-one. Additionally, other health care professionals (e.g., nurses, physical therapists) provide CR services, which may create confusion among the public as well as clinicians about the CEP's role in the continuum of patient care and their ability to work independently. This is particularly concerning in settings that do not recognize the unique skillset CEPs possess that can be leveraged to optimize patients' health outcomes. The Centers for Medicare & Medicaid Services, which regulate the delivery of CR for beneficiaries of Medicare and Medicaid insurance in the United States, do not define staffing for CR programs (11).

Sign and symptom-limited maximal exercise (stress) testing is a frequently performed test in cardiology and provides important information regarding the diagnosis, treatment, and care of individuals with, or suspected of, a cardiac-related problem (14). For participants in CR, maximal exercise tests are considered the gold standard for developing an individualized exercise prescription and for clearing individuals to return to moderate to vigorous physical activity (25–27). Additionally, maximal exercise tests with the measurement of expired gases (e.g., cardiopulmonary exercise tests) are used extensively in risk stratification of individuals with heart failure and congenital heart disease (28). CEPs have the technical skills to perform these tests and the knowledge to interpret the results (16).

There are important limitations of this study. First, these data represent a small and select sample. It will be important to collect similar data in a broad sample of institutions representative of the United States. Planning for such an effort is underway by the CEPA working group. Second, these data should not be interpreted as defining a scope of practice for CEPs. When individuals speak of scope of practice, they are often referring to a *legal* scope of practice. Legal scope of practice are the activities a health care professional are permitted to perform as defined by the state board that regulates the profession and the rules adopted in the state licensing statute for that profession (29). However, there is also a *professional* scope of practice (29). Professional scope of practice is based on the knowledge, skills, and experiences of a professional (29). This study may be a useful reference for employers as they define the professional scope of practice and job tasks for CEPs in their programs.

CONCLUSION

CEPs play an integral role in the conduct of CR and noninvasive cardiology exercise testing laboratories. Granting privileges to CEPs that allow them to work at the top of their knowledge and skills will free other health care professionals (e.g., nurses) to better use their skills in other high demand areas. As stated by Berry et al. (1), the barriers to growth for the CEP profession stem from a lack of awareness of the skills and abilities of CEPs among employers. Better recognition of the knowledge and skills of CEPs and common job tasks may help to enhance acknowledgment among health care administrators for salary compensation equity along with increased CEP employment opportunities. While we focused on the job tasks of CEPs in CR and clinical exercise testing in the present study, it is reasonable to assume that they can equally staff programs for patients with other chronic conditions (e.g., cancer).

Acknowledgments: The authors appreciate the time and contributions from Dave Ukestad at CHI St. Alexius Health and Joseph Bryant at U-M Health System: Michigan Medicine.

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