

The State of Clinical Exercise Physiology in the United States

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ABSTRACT

The current state of the profession of clinical exercise physiology in the United States is that of evolution. Individuals now identified as clinical exercise physiologists (CEPs) first emerged in health care in the nascent cardiac rehabilitation programs in the late 1960s and have remained strongly identified in that role ever since. However, the profession has had difficulty expanding into other similar areas, largely due to the lack of standardized academic preparation. This contributes to uncertainty and confusion among other health care providers regarding appropriate roles and responsibilities for a CEP. Future directions for the profession of clinical exercise physiology include requiring certification candidates to graduate from accredited programs so the academic preparation becomes standardized. The American College of Sports Medicine (ACSM) is currently investigating modifying the eligibility criteria for the ACSM-CEP certification to address this requirement. The Clinical Exercise Physiology Association is currently assembling a writing team to draft a CEP scope of practice document for the support and endorsement of other professional organizations. The last item is the strengthening or creation of liaisons with other professions to develop a collaborative care model that takes full advantage of the skillset CEPs bring to chronic disease management. *Journal of Clinical Exercise Physiology*. 2020;9(4):148–154.

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INTRODUCTION

The profession of clinical exercise physiology is a relatively new addition to the allied health professions in the United States (US), starting in the late 1960s (1). Physical therapy, by contrast, had been established as a profession by 1921 when the first physical therapy professional organization was formed (2). The purpose of this article is to briefly review the history of clinical exercise physiology, discuss what defines a profession, describe the current state of the clinical exercise physiologist (CEP) in the US, and look at future challenges and opportunities for the profession.

HISTORY

The formal study of exercise physiology in the US began in the 1860s, with several universities establishing academic

programs in exercise physiology, one of the first being at Amherst College in Massachusetts. There, Dr. Edward Hitchcock and his son developed a rudimentary exercise physiology program, including a formalized curriculum and textbook in exercise physiology (3). During the 20th century, departments of physical education became established in many universities. By 1960, exercise physiology was entrenched in these departments, and courses in biomechanics, motor learning, exercise physiology, and therapeutic exercise were being offered (4). Exercise physiology had been established as an academic pursuit, but it was not yet a clinical discipline.

In 1968, the Dallas Bed Rest Study was published by Saltin et al., detailing the debilitating effects of prolonged bedrest (5). This landmark paper, along with the work of

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Hellerstein, Naughton, Bruce, and many others established the physiologic basis of the benefits of exercise and led to the development of multidisciplinary outpatient cardiac rehabilitation programs (6). Initially these programs, often held in a Young Men's Christian Association (YMCA) gymnasium or similar facility, were run by registered nurses, and graduates of physical education programs were sometimes used to assist with the exercises. By 1974, the number of these programs had increased to the extent that the American College of Sports Medicine (ACSM) developed first the Program Director certification and shortly thereafter the Exercise Specialist certification (now the Clinical Exercise Physiologist [CEP]) to identify people with the skills to work in cardiac rehabilitation (7). This certification remains important to the CEP to this day.

WHAT DEFINES A PROFESSION

What makes a profession different from an occupation? Academic models tend to focus on key attributes that a group needs to possess to be considered a profession. A review of these models reveals that there are several recurrent elements required of a profession, including education, experience, and examination (8). Education refers to the specialized training, knowledge, and skills that are required to practice the profession at a minimally competent level. Once most of the requisite training and skills are acquired, professionals usually must gain experience and demonstrate competence in their field under supervision as part of an apprenticeship or internship. After the completion of formal education programs and supervised experience, a profession generally requires some sort of capstone assessment to ensure that the prospective professional has attained a sufficient level of competence before practicing independently.

CURRENT STATE OF THE CEP IN THE US

The first widespread use of CEPs was in outpatient cardiac rehabilitation, as mentioned above. Since then, the practice area of the CEP has expanded to include pulmonary rehabilitation, diabetes management, bariatric clinics, adult weight management, stress testing, exercise oncology, and other chronic diseases for which exercise has been shown to be of therapeutic benefit (1). According to the 2015 Clinical Exercise Physiology Association (CEPA) salary survey, 86% of CEPs reported that their patient population did not include "apparently healthy" individuals, with the largest segment, approximately 71%, being primarily those with cardiovascular or pulmonary disease. This differentiates the CEP from personal trainers and others in the health fitness field who work predominately with healthy clients.

Academic Preparation

The minimum educational requirement for these positions is a bachelor's degree in exercise science, exercise physiology, or equivalent (9,10). Additionally, most employers require a certification in basic cardiopulmonary resuscitation, and CEPs working in cardiac or pulmonary rehabilitation are often expected to have an American Heart Association

Advanced Cardiac Life Support certification soon after being hired. The academic course work in a clinical exercise physiology program typically includes, but is not limited to, coursework in anatomy and physiology, pathophysiology of common chronic diseases, basic electrocardiogram interpretation, principles of exercise testing, prescription and supervision, and pharmacology. Most, but not all, academic programs also require the student to undergo a culminating experience such as an internship or directed research project before graduation.

Academic Accreditation

One of the challenges faced by clinical exercise physiology students is that breadth and depth of curricula can vary significantly between academic institutions. Since 2004, the Committee on Accreditation for the Exercise Sciences (CoAES) has worked with a multi-organizational consortium including ACSM, the American Council on Exercise (ACE), and others to establish standards and guidelines for academic programs in the exercise sciences. These include requiring the student to complete an internship or research project and pass a national credentialing examination before being awarded his or her degree (11). Accreditation of academic programs functions as a quality control measure both in terms of academic preparation and assisting prospective students in selecting a program to attend. Unfortunately, as of April 2020, there are only 8 CoAES-accredited clinical exercise physiology programs in the US at the master's level and 0 at the baccalaureate level (12). The lack of accredited programs at the entry educational level is indicative of a major systemic gap in the academic preparation of CEPs.

Accreditation Challenges

Not only is there an inadequate number of accredited clinical exercise physiology programs, but the profession of clinical exercise physiology also struggles to impress upon colleges, universities, employers, and prospective students the importance of accreditation. Many employers and prospective students seem to be unaware of the existence of accredited clinical exercise physiology programs. Conversation with leading academics in clinical exercise physiology indicates that many programs are not accredited simply because there is little current demand for such programs; neither employers nor students are seeking out accredited programs.

The low number of accredited programs is a significant factor in the variance in the quality of job candidates among recent graduates of academic programs. Discussions with employers and internship supervisors reveal a wide range regarding the skill set of CEPs just entering the profession. Without either accreditation or standardized academic preparation as occurs in other health care professions, this variability contributes to confusion and uncertainty regarding the degree of autonomy that CEPs should be accorded. This frequently manifests itself as misconceptions about what roles and responsibilities can be assigned to CEPs. For example, some health systems in the US erroneously believe that CEPs cannot supervise stress testing. In fact, the

TABLE 1. Prerequisites for American Council on Exercise (ACE) Medical Exercise Specialist (MES) and American College of Sports Medicine (ACSM) Clinical Exercise Physiologist (CEP) certification applicants.

	ACE MES	ACSM CEP
Minimum age	18 y old	18 y old
Minimum degree	Bachelor's degree in exercise science or equivalent	Bachelor's degree in exercise science or equivalent
CPR certification required	Yes	Yes
Experience	500 h; designing and implementing exercise programs for apparently healthy and/or high-risk individuals, as documented by a qualified professional.	600 hands-on clinical experience for Master's degree candidates; 1200 hands-on clinical experience for Bachelor's degree candidates

CPR = cardiopulmonary resuscitation

American College of Cardiology and the American Heart Association Clinical Competence statement on stress testing published in 2000, includes CEPs (and nurses) among those providers qualified to supervise a test provided a physician is “in the immediate vicinity or on the premises” (13). Other misconceptions include that CEPs must have documentation cosigned by a licensed provider or cannot work in management roles; particularly, they would be supervising nurses. Simply put, these restrictions generally result from local policies, as there are no national guidelines that prohibit CEPs from performing these tasks. These misconceptions persist because of the confusion generated by the low number of accredited programs and subsequent wide variability in competency, especially among CEPs just entering the profession.

Professional Certification

In the absence of required graduation from an accredited program, some CEPs choose to become voluntarily certified as a way of demonstrating that they have attained a minimum level of competency. Employers frequently list clinical

TABLE 2. Recommended distribution of clinical experience (2018 American College of Sports Medicine-Clinical Exercise Physiologist [ACSM-CEP] requirements; used with permission from ACSM).

Condition or Disease	Clinical Hours	
	Master's Degree	Bachelor's Degree
Cardiovascular	180	360
Pulmonary	40	80
Obesity/metabolic	150	300
Orthopedic/ musculoskeletal	40	80
Neoplastic	40	80
Frailty	40	80
Behavior change/ education	70	140
Neuromuscular	40	80
Total hours	600	1,200

exercise physiology certification as a preferred qualification in job postings, with 61% of respondents to the 2015 CEPA Salary Survey reporting they had an ACSM clinical certification and 36% reporting it was required by their employer. Only 2 clinically focused, externally accredited certifications are currently available in the US, the ACE Medical Exercise Specialist (MES), and the ACSM Certified Clinical Exercise Physiologist. A comparison of the prerequisites for each can be found in Table 1.

The ACSM certification specifies that the hours must be gained exclusively from a clinical setting and makes recommendations for the distribution of those hours (Table 2). Observation hours and nonclinical experience may not be applied to the experiential requirement. This coupled with the greater number of hours required compared to the ACE certification makes the ACSM Certified Clinical Exercise Physiologist credential more desirable to employers based on discussions with prominent leaders in the profession.

Most applicants complete these hours as part of an internship before graduating from their academic program, though it is worth noting that the ACSM requirements of bachelor's students in particular exceed the number of hours students normally attain during a single internship, so these candidates must gain additional experience before being eligible for the certification exam.

Work Environment and Wages

In the US, CEPs work in a wide variety of work environments, as detailed in Table 3. The staffing models for these various work environments are highly individualized. No national guidelines exist for composition of staff working in clinical environments (e.g., cardiopulmonary rehabilitation, cardiovascular stress testing, physical therapy clinic), and each institution has its own policies regarding staffing. Discussions with program directors and managers reveal that the majority of CEPs working in these environments work under the direction of another allied health professional, such as a registered nurse or physical therapist, more often than not. While that staffing model is predominant in the US, a competent CEP can work independently or supervise others in any of the environments listed in Table 3. Some cardiopulmonary rehabilitation (CR) programs are run and directed by CEPs, and others have CEPs working side by

TABLE 3. Most common work environments of the clinical exercise physiologist (CEP) in the US (adapted from 2015 Clinical Exercise Physiology Association Salary Survey).

Setting	Percentage of Workforce that are a CEP (%)
Cardiac rehabilitation	43
Commercial/community fitness center	12
University	10
Cardiovascular stress testing	8
Hospital wellness	7
Corporate wellness	6
Government fitness/wellness/research	5
Other hospital/medical program	3
Physical therapy clinic	2
Weight loss or bariatric surgery clinic	2
Pulmonary rehabilitation	2

side with other disciplines, e.g., nurses or physical therapists. A CEP is fully capable of working independently or in a supervisory role in both CR and cardiovascular stress testing despite widespread misconceptions to the contrary. In fact, given that CEPs are specifically academically prepared to evaluate the acute and chronic responses to exercise, they are likely better suited for those roles than most other allied health professionals. CEPs working with less acute populations (e.g., commercial or corporate fitness, wellness programs, weight loss clinics) may work either one on one with clients or lead group classes. These CEPs may report directly to a more senior CEP, an allied health provider, or possibly an administrator of the facility or program.

CEPs in the US tend to earn less than other allied health professionals that also require a bachelor's degree for entry into their profession (Table 4). The reason for this is unclear, though the fact that no widely available billing codes are appropriate for an individual CEP to use likely plays a role. CEPs, like registered nurses (RNs) and dietitians/nutritionists, do not bill third-party payors directly for services delivered in the hospital setting. Services provided are billed through a health care facility (e.g., clinic, hospital) usually as part of comprehensive care. The key difference when it comes to CEPs is that the number and variety of services they provide is lower

TABLE 4. Comparison of 2019 median salaries for selected health care professions adapted from US Bureau of Labor Statistics.

	Entry Level Degree	2019 Median Salary
Exercise physiologist	Bachelor's	\$49,170
Dietician/nutritionist	Bachelor's	\$61,270
Registered nurse	Bachelor's	\$73,300

than either RNs or registered dietitians/nutritionists. Employers may believe that this limits the CEP's ability to generate revenue, thus decreasing their perceived value. Most CEPs that work outside of hospital or physician-based programs are self-employed and paid directly by their patients (14).

Educational level has a significant effect on wages for CEPs. The median income for a bachelor's prepared CEP with less than 2 years' experience in 2015 was \$38,751, while master's prepared CEPs with the same experience earn \$41,251, or 6.5% greater. Additional years of experience equate to higher wages, with the median wage for bachelor's CEPs and 21 to 25 years of experience being \$53,751, and master's CEPs with the same experience have a median income of \$61,251, or 14% greater. Most CEPs in the US have earned a master's degree, according to both the CEPA Salary Survey (58%) and an ACSM audit of 2018 CEP certification candidates (55%). Functionally, a master's degree is the terminal degree for CEPs, with those going on to earn a doctorate usually moving into research and away from having a significant portion of their time spent in direct patient care.

Certification status also factors into wages, particularly for bachelor's prepared CEPs. Those CEPs with a bachelor's degree and an ACSM clinical certification earn 17.6% more per hour than their non-ACSM certified peers. Master's prepared CEPs with an ACSM clinical certification earn 2.6% more per hour than their non-ACSM certified peers. Data on hourly pay rate and certification status do not take into account years of experience. Data on the only other externally accredited, clinically focused certification, the ACE MES, were not included in the analysis simply because 2015 was the inaugural year for that credential (2015 CEPA Salary Survey).

Number of CEPs in the US

The precise number of CEPs working in the US is difficult to ascertain, in part because no one organization is keeping track of this information and also because nonclinical exercise physiologists are sometimes hired into CEP roles. Using the CEPA survey data and the number of currently ACSM certified individuals, it is estimated that approximately 6000 CEPs are working in the US. However, the US Bureau of Labor Statistics (BLS) estimated that approximately 15,800 exercise physiologists were in the US in 2018 (15). The BLS data on exercise physiologists do not differentiate between those working in clinical versus nonclinical settings, although the BLS description of the position includes the phrase, "help injured and sick patients recover," (15) possibly indicating a predominately clinical setting. One limitation of the CEPA survey is that it was sent to ACSM-certified CEPs, and the membership of the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR). Potential CEP respondents who are not ACSM certified or AACVPR members were likely underrepresented.

Licensure

Licensure is an area of great interest for some CEPs in the US, despite only one state, Louisiana, having a CEP licensure law. Between 2010 and 2019, CEPs in 8 states (i.e.,

Maryland, Massachusetts, Minnesota, Montana, North Carolina, Oklahoma, Texas, Wisconsin) either formed legislative committees to explore licensure or filed bills with the legislature (16). Many supporters of licensure for CEPs believe that having a license will “level the playing field” with other allied health professions enabling CEPs to bill insurance providers directly for services and ultimately lead to higher wages (17). These supporters misunderstand the fundamental purpose of licensure: to protect the public from harm arising from the unregulated practice of a profession (e.g., a house fire resulting from an unlicensed electrician incorrectly installing wiring in a home). Licensure is not intended to protect or benefit the license holder (18).

To date, none of these efforts have achieved success for several reasons. First, a lack of evidence demonstrates public harm secondary to the unregulated practice of clinical exercise physiology (19). Without this evidence, a compelling reason to restrict the practice of CEPs does not exist. Second, the relative lack of accredited academic programs and consequent uncertainty regarding the formal preparation of potential license holders has proven to be a difficult hurdle to overcome. Third, both the Obama and Trump administrations have observed that licensing adds significantly to the cost and complexity of delivering health care, while restricting the public’s access to qualified professionals (20). Until evidence shows that the unregulated practice of CEPs represents a threat to the safety of the public, the quality of academic preparation of licensure candidates is standardized, and a shift happens in the political environment, widespread licensure of CEPs in the US is unlikely.

Future Directions

The CEP profession has grown from its infancy in YMCA gymnasiums in the early 1970s. Today, cardiac and pulmonary rehabilitation are common in most medium-sized hospitals or larger, and many of these programs employ at least 1 CEP. Numerous chronic diseases exist for which supervised exercise has been shown to have therapeutic benefit (e.g., cancer, diabetes, peripheral arterial disease) (21,22). These represent additional practice areas for the CEP and

ideally opportunities for growth of the profession. However, CEPs have struggled to move beyond just the cardiac/pulmonary rehabilitation and into prominent roles treating other chronic diseases. CEPs are underused in the management of chronic disease for 3 primary reasons: lack of standardized academic preparation, lack of a generally agreed-upon scope of practice, and lack of awareness regarding the CEP’s skillset among employers and the public.

The academic preparation of a CEP is highly variable, creating issues concerning the quality of program graduates and employer confidence in the skillset, as previously discussed. The best way to address the variability in academic preparation is to standardize the curriculum of clinical exercise physiology programs through accreditation. Universal programmatic accreditation helps assure that graduates from accredited programs have all received similar formal training, much like the academic models used in medical school, nursing, physical therapy, etc. This reduces the number of underprepared CEPs entering the profession, thereby increasing employer confidence. Table 5 lists potential considerations for CEPs entering the profession and employers.

Accreditation is a necessary step to move the clinical exercise physiology profession forward. Employers need to have the confidence in the abilities of the CEP profession before job opportunities can increase. Precedent has been set for accreditation being tied to reimbursement as well. In 2006, Australian accredited exercise physiologists were granted provider status by the national universal health care system (Medicare), thus becoming eligible to receive reimbursement for certain services (23). The US health care system, with its multiple payors, would take some time to follow suit regarding reimbursement for CEPs, but the Australian model illustrates the value of accreditation.

As a founding member of CoAES, the ACSM understands the value of academic accreditation. At the time of writing, the ACSM Certification Board is actively investigating the feasibility of amending the ACSM-CEP educational requirement to include graduation from an accredited exercise physiology program. A decision regarding this proposal is pending. If ACSM moves forward with this

TABLE 5. Potential considerations for clinical exercise physiologist (CEP) students and employers.

Students	Employers
Attend an accredited clinical exercise physiology academic program if possible	Recognize that CEPs are trained to evaluate the acute and chronic responses to exercise unlike many other allied health professionals (e.g., nurses, respiratory therapists)
Complete an internship that offers hands-on experience in a variety of settings (e.g., inpatient and outpatient cardiac/pulmonary rehabilitation, stress testing, weight management or bariatric surgery, group wellness)	Value candidates graduating from an accredited academic program and with diverse internship experience
Earn an externally accredited, clinically focused, certification (i.e., ACE MES or ACSM CEP)	Value candidates who have earned an externally accredited, clinically focused, certification (i.e., ACE MES or ACSM CEP)
	Be familiar with regulations governing the service being provided to maximize the use of CEPs and their skillset

ACE = American Council on Exercise; ACSM = American College of Sports Medicine; MES = Medical Exercise Specialist

initiative, a multiyear rollout period would allow colleges and universities time to prepare for any substantive programmatic changes to their academic programs. The investigation of the ACSM model includes a recommendation for the distribution of the required supervised clinical experiential hours and passing the ACSM certification exam. The combination of the certification exam, which is externally accredited by the National Commission for Certifying Agencies, and the required clinical experience make for a very robust credential.

The lack of a generally agreed-upon scope of practice for CEPs is another barrier to the growth of the profession. In the absence of an agreed-upon scope of practice, decisions regarding job roles and responsibilities are frequently made by administrators who may not be familiar with the skillset of the CEP, often erring on the side of excluding CEPs from positions they are qualified to hold. One option to rectify this would be for professional organizations familiar with the capabilities of the CEP to develop a scope of practice statement outlining the roles and responsibilities appropriate for CEPs. Once such a statement is developed, the next step would be to get it endorsed by other professional organizations with broader reach (e.g., American College of Cardiology, American Heart Association, American Medical Association) to increase the strength of the scope of practice statement. As of this writing, CEPA is assembling a multidisciplinary writing team to develop a scope of practice document.

One of the largest barriers to the growth of the clinical exercise physiology profession is the lack of awareness of the skillset of CEPs among employers and the public. This lack of awareness translates into a lack of demand for the skillset that CEPs possess. The solution for this is a strategic plan that includes a marketing campaign aimed at health care providers (e.g., nurses, physicians) providing education as to the roles that CEPs can fill in the management of chronic disease. The fact that CEPs are among the only allied health care providers specifically trained to evaluate the acute and chronic response to exercise, develop exercise prescriptions, and provide risk factor modification counseling should be the focus of such a campaign.

It would be premature to launch a marketing campaign highlighting the skillset of CEPs before the issues of

accreditation and a generally agreed-upon scope of practice have been resolved. It does little good to try to promote a product with unknown quality and indeterminate purpose. Once the quality of graduates from clinical exercise physiology programs is more consistent and expectations of how a CEP contributes to the management of chronic disease are more defined, then the marketing campaign becomes the final piece needed to move the clinical exercise physiology profession forward.

Professional organizations (i.e., ACSM, CEPA) need to develop strategies between now and when the marketing campaign is ready to be launched to connect with other health care providers. Liaisons with the professional organizations of other health care providers (e.g., dietitians, nurses, physical therapists, physicians) should be established and strengthened. These liaisons should be used to build a collaborative model for treating chronic disease for which the contributions of the CEP are understood and valued. Once this model is embraced by other health care providers, the demand for CEPs to be part of chronic disease management will increase, helping to grow the profession.

SUMMARY

The clinical exercise physiology profession in the US has grown from its beginnings in cardiac rehabilitation programs held in YMCA gymnasiums in the late 1960s but has not yet become fully integrated with other allied health professions in the management of chronic disease. The lack of accreditation of academic programs and an agreed-upon scope of practice for CEPs have contributed to lower wages and opportunities than other similarly academically prepared health care providers. ACSM and CEPA are working to address these issues. ACSM is investigating plans to require applicants for their certifications to come from accredited programs in the near future, and CEPA will develop a scope of practice for CEPs, then seek the endorsement of other professional organizations to promote its acceptance among health care providers. These measures, coupled with a strategic plan and marketing plan to build collaborative models of chronic disease management with other providers, are needed to advance the profession of clinical exercise physiology in the US.

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