Professional Doctorate in Clinical Exercise Physiology

POINT: An Argument in Favor of This Model

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INTRODUCTION

The professional clinical exercise physiologist (CEP) has played a prominent and evolving role in delivering safe and efficacious exercise interventions aimed at improving numerous aspects of health, such as (a) cardiorespiratory and muscular fitness; (b) quality of life; (c) metabolic health; (d) reducing the risk of future adverse events; and (e) facilitating the long-term adoption of healthy lifestyle characteristics in individuals under their care, from those who are apparently healthy to those at risk for developing one or more chronic health conditions to patient populations with a confirmed diagnosis. The development of the profession in the 1960s and its vast expansion in the 1970s primarily focused on delivering physical activity interventions to those with cardiovascular (1) and/or pulmonary diseases (2). CEPs have also significantly contributed to uncovering the clinical use of exercise testing, in particular expanding the use of the gold standard approach in both clinical and research settings (i.e., cardiopulmonary exercise testing) (3-6). The work by CEPs significantly contributed to cardiorespiratory fitness being endorsed as a vital sign by the American Heart Association (7). Although a consistently growing body of scientific literature has highlighted the health benefits of aerobic and strength training in populations previously considered too frail (e.g., cancer, chronic kidney disease, human immunodeficiency virus), the predominant area of employment for CEPs remains in cardiopulmonary rehabilitation and exercise testing facilities (8) even though it is evident that exercise interventions should be formally employed across virtually all clinical populations. While the explanatory reasons for these observations are likely multifactorial, a prominent factor relates to a heavier emphasis placed on preparing CEP students to work in cardiopulmonary rehabilitation settings. Even within cardiopulmonary rehabilitation programs, it is apparent that the employment opportunities for recently graduated CEP students are becoming more competitive, particularly when considering that facilities have been shown to often prefer hiring nurses because of their extensive professional training to care for chronic disease patients in clinical settings (9).

While there are many strategies that can and should be employed to reverse these growing trends, our group recently proposed to elevate the clinical preparation of the CEP by creating a professional doctorate in clinical exercise physiology (DCEP), adopting the trend of other allied health professions, including physical and occupational therapy as well as nursing. Primary goals of the DCEP are to: (a) promote autonomy within the CEP scope of practice, similar to other allied health professionals; (b) produce highly qualified and competitive candidates for professional roles; and (c) enhance didactic and experiential training in order to expand the patient populations CEPs care for (10).

For the purposes of appreciating the proposed model, it is important to stress the distinction between the researchbased doctorate (i.e., PhD) and the professional doctorate, the latter of which describes the proposed DCEP. Whereas a

Conflicts of Interest and Sources of Funding: None.

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PhD graduate program prepares students to conduct research studies aimed at advancing the body of knowledge in an area of interest and effectively communicate findings through manuscripts and oral presentations, the professional doctorate is intended, through didactic and laboratory training followed by supervised clinical experiences, to prepare professionals to work in various clinical settings (i.e., generalist). This paper will outline the rationale, conceptualization, and structure of the DCEP model, with the primary aim of garnering support for taking this step to ensure sustainability and success of the CEP profession moving forward.

RATIONALE FOR DEVELOPING A DCEP MODEL

The demand for trained professionals to deliver safe and effective exercise interventions in the clinical setting has consistently grown because of the high prevalence of heart disease in the United States (11), coupled with a growing number of health care institutions recognizing the multifaceted benefits associated with structured exercise interventions (12). This demand has become accentuated by the troubling rise of multimorbidity (diagnosis of ≥ 2 chronic conditions) in the United States, with over three-quarters of adults ≥ 65 years of age fitting this classification (13). Managing numerous conditions, such as cardiovascular disease, diabetes, chronic kidney disease, history of stroke, and active cancer treatment, complicates the delivery and supervision of exercise interventions by requiring a greater understanding of the safety precautions, clinical management of each condition, and interactions among conditions. Accordingly, administrators of exercise-based programs may prefer hiring allied health professionals with an in-depth clinical understanding of complex clinical conditions (9). In fact, a survey of cardiac rehabilitation programs across the country demonstrated that on average, 38% of the staff delivering exercise services was made up of nurses, whereas only 28% were CEPs (14). It has also been noted that 12 (36%) of 33 surveyed cardiac rehabilitation facilities in the mid-Atlantic region preferred hiring registered nurses over CEPs, whereas only 4 (12%) programs preferred hiring CEPs over registered nurses. Managers commonly reported that their preference in hiring nurses was because of their perception that nurses possess stronger clinical skills (i.e., examination and intervention skills), a deeper understanding of clinical conditions, and the notion that CEPs do not have enough clinical training (9). This is particularly concerning for the field of CEP considering that CEPs are supposed to be trained to deliver exercise interventions to patients with chronic conditions, thus indicating that current CEP training models are becoming obsolete. Existing graduate-level CEP programs commonly occur over the course of 1 to 2 years, with many requiring students to complete a thesis or research project. This effectively reduces the amount of time and attention that could have otherwise been directed toward taking clinical coursework and building valuable tangible skills during rotations across clinical settings that extend beyond cardiopulmonary rehabilitation. Therefore, to adequately prepare students passionate about pursuing a clinical career, it is time

for the profession and universities to reimagine the training model with the ultimate goal of increasing didactic and practical opportunities at rigorous levels.

DCEP EDUCATIONAL MODEL

It should first be recognized that numerous graduate programs have produced generations of effective practitioners that have aided in the physical rehabilitation of patients while reducing the risk of future events in those with chronic health conditions. However, the trends in worsening patient health and potential decline of the CEP's professional autonomy among the allied health professions indicates that the professional preparation of CEPs must be reimagined and elevated similar to what other groups have accomplished (e.g., Doctor of Physical Therapy, Doctor of Occupational Therapy, Doctor of Pharmacy) in order to meet the demands of the evolving clinical landscape. Accordingly, the proposed professional DCEP model should build upon the training students receive during their master's program and deliver rigorous didactic and practical education covering the clinical management of patients with complex health conditions that are not comprehensively reviewed within most CEP programs. This model is presented in detail in our recent publication (10). Briefly, we propose that the professional DCEP model focus almost entirely on the student's development as a clinical practitioner with 1 to 2 years of didactic course work, at least 1 year of clinical rotations, and the successful completion of a capstone project that affords students the opportunity to understand basic research methods and their translation to clinical practice without the expectations of completing a thesis. This proposed structure will therefore allow students to capitalize on numerous learning opportunities geared to prepare them for a career as a CEP.

In conceptualizing the structure and the curriculum for the proposed program at the University of Illinois at Chicago (10), a review of existing master's programs was conducted to determine clinical content areas typically not covered. This process revealed graduate programs placing a primary emphasis on delivering didactic and practical training in the area of cardiopulmonary diseases, electrocardiogram interpretation, exercise testing, and prescription. Accordingly, students were mainly trained to obtain the American College of Sports Medicine's (ACSM) Certified CEP credential with little to no emphasis on preparing for careers in exercise rehabilitation programs outside of cardiopulmonary rehabilitation or obtaining other specialty certifications available through ACSM (i.e., Certified Cancer Exercise Trainer, Certified Inclusive Fitness Trainer) and other organizations. Therefore, it is not surprising that a large portion of primary work settings for CEPs are in cardiac rehabilitation (43%), with fewer in cardiovascular exercise stress testing (8%), pulmonary rehabilitation (2%), bariatric exercise programs (2%), and cancer rehabilitation (<1%) (8). Noting these skewed work placement distributions and largely singular cardiopulmonary focus of current graduate level programs, we believe future DCEP programs should include course work and clinical rotations that prepare students to also become Certified Cancer Exercise Trainers and Certified Inclusive Fitness Trainers. Moreover, large national and global surveillance studies have revealed a sobering rise in the prevalence of diabetes (15). To combat these trends, the use of Certified Diabetes Educators has been promoted by the American Heart Association (16), and recently ACSM Certified CEPs have been included within the list of practitioners eligible to become and practice as Certified Diabetes Educators. Given the high prevalence of patients with diabetes in exercise programs delivered by CEPs (17), DCEP programs should provide offerings for students to build the theoretical foundations of delivering diabetes self-management strategies to patients while affording opportunities to accumulate practical hours necessary for eventually sitting for the Certified Diabetes Educator exam. At a minimum, these additional areas of clinical training should be a part of the standard offerings within future DCEP programs, while, through an elective course portfolio, allowing flexibility for programs to provide training in areas of their choosing to fit the demands of their region. For instance, the proposed DCEP program at our institution will include didactic and practical training for students to become Registered Diagnostic Cardiac Sonographers. Acquiring this training will expand the skillset of aspiring professional CEPs, effectively increasing the continuum of care that can be provided by the CEP, which may translate to increased employment opportunities.

Under the traditional master's level preparation of CEPs, students commonly complete an introductory seminar course that reviews the professional responsibilities of an employee working in cardiac rehabilitation and/or pulmonary rehabilitation settings. Topics may include different phases of cardiac/pulmonary rehabilitation and qualifying diagnoses, appropriate documentation of patients' initial treatment plans and follow-up assessments, understanding insurance practices at an introductory level, and basics of program design. However, many programs do not offer a high level of training that builds strong foundations in leadership, personnel management, marketing, business models, or program development. Many of these professional skills are instead acquired on the job over the course of a career. For this reason, the professional DCEP program will offer a series of professional development courses that prepare students to be effective leaders, (i.e., program managers) that understand the importance of ensuring financial stability of clinical services as well as garner the ability to become persuasive advocates of services provided by CEPs. Acquiring these professional traits across a generation of CEPs will facilitate the effort of expanding professional opportunities and clinical offerings.

INITIAL PERSPECTIVES AND FUTURE DIRECTIONS

To gauge the initial perspectives of the proposed DCEP program, we developed and distributed a short survey to students and cardiopulmonary rehabilitation managers. In both surveys, a short description of the didactic and practical



FIGURE 1. Proportion of students (MS, n = 70 and PhD, n = 9) and recently hired clinical exercise physiologist (CEP) professionals (n = 23) expressing interest in enrolling in a Doctor of Clinical Exercise Physiology program if it existed.

training opportunities as well as the anticipated skillset of graduating students were provided in both surveys. As student recruitment would occur nationwide, we distributed surveys to master's level CEP programs in Delaware, Illinois, Indiana, Massachusetts, Maryland, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Virginia, Wisconsin, and Wyoming. Among the 102 respondents, 70 were active master's students, 9 were PhD students, and 23 students had recently started working in professional CEP position at the time the survey was distributed. Upon asking whether students would be interested in continuing their education and enrolling in a DCEP program, 80%, 78%, and 65%, respectively, responded yes (Figure 1), with a smaller portion responding no (7%, 11%, and 13%, respectively) or unsure (13%, 11%, and 22%, respectively). The program manager survey was sent to cardiopulmonary programs in Illinois, as our primary interests were assessing employers within Illinois. A total of 21 program managers replied, with the majority (n = 19) hiring both CEPs and nurses. When asked if managers would be more inclined to hire a DCEP over a master's prepared CEP, 13 (62%) responded that they would, demonstrating that the DCEP would be a more attractive hire in a majority of facilities when considering their theoretically extensive clinical preparation and skillset over a traditionally prepared master's candidate. Although a more expansive survey is required to accumulate perspectives of enrolling in a DCEP program or hiring a DCEP, these initial surveys present favorable perceptions of moving toward a DCEP model.

Lastly, it is important to acknowledge that developing and transitioning programs to the DCEP model will be a multiyear process, similar to the transition that occurred in physical therapy. In the proposed DCEP program at the University of Illinois at Chicago, applicants will be required to have obtained a master's degree from a program that offered standard clinical exercise physiology courses (e.g., advanced exercise physiology, exercise testing and prescription, EKG interpretation) and have obtained experience working in cardiopulmonary rehabilitation programs or other programs that implement exercise interventions in patients with **POINT/COUNTERPOINT**

chronic diseases. These students will then complete the additional coursework, clinical rotations, and program criteria over a period of 1 to 2 years to fulfill the expectations of the DCEP program. As partnering universities adopt and/or express interest in moving toward the DCEP model, key stakeholders in this effort and organizations representing CEPs will need to work toward a standardization of programs, similar to the Doctor of Physical Therapy and Doctor of Occupational Therapy.

To summarize, the primary goals of creating DCEP programs are to (a) expand the clinical preparation of CEPs through rigorous didactic and clinical rotations in order to

REFERENCES

- 1. Mampuya WM. Cardiac rehabilitation past, present and future: an overview. Cardiovasc Diagn Ther. 2012;2(1):38–49.
- Casaburi R. A brief history of pulmonary rehabilitation. Respir Care. 2008;53(9):1185–9.
- Kaminsky LA, Arena R, Ellingsen O, Harber MP, Myers J, Ozemek C, Ross R. Cardiorespiratory fitness and cardiovascular disease—the past, present, and future. Prog Cardiovasc Dis. 2019;62(2):86–93.
- 4. Arena R, Ozemek C. Intracardiac multimorbidity: assessing right ventricular function in left-sided heart failure through cardiopulmonary exercise testing. Expert Rev Cardiovasc Ther. 2019 May;17(5):331–3.
- 5. Ozemek C, Arena R. Cardiopulmonary exercise testing in patients with heart failure and a preserved ejection fraction: filling the prognostic knowledge gap. Rev Esp Cardiol (Engl Ed). 2018 Apr;71(4):237–9.
- Guazzi M, Bandera F, Ozemek C, Systrom D, Arena R. Cardiopulmonary exercise testing: what is its value? J Am Coll Cardiol. 2017 Sep 26;70(13):1618–36.
- Ross R, Blair SN, Arena R, Church TS, Despres JP, Franklin BA, Haskell WL, Kaminsky LA, Levine BD, Lavie CJ, Myers J, Niebauer J, Sallis R, Sawada SS, Sui X, Wisloff U; American Heart Association Physical Activity Committee of the Council on Lifestyle and Cardiometabolic Health; Council on Clinical Cardiology; Council on Epidemiology and Prevention; Council on Cardiovascular and Stroke Nursing; Council on Functional Genomics and Translational Biology; Stroke Council. Importance of assessing cardiorespiratory fitness in clinical practice: a case for fitness as a clinical vital sign: a scientific statement from the American Heart Association. Circulation. 2016 Dec 13;134(24):e653–99.
- Kerrigan DJ, Verrill DE, Harding AW, Drew K. CEPA 2015 clinical exercise physiology practice survey. J Clin Exerc Physiol. 2017;6(1):9–16.
- Bowersock AH, Breeding WA, Sheppard CA. Hiring practices of exercise physiologists in cardiac rehabilitation programs among mid-Atlantic states in the United States. J Clin Exerc Physiol. 2016;5(3):32–7.
- Ozemek C, Kaminsky LA, Brubaker PH, Lavie CJ, Arena R. Time to elevate the education of clinical exercise physiologists: a professional doctorate model. Transl J Am Coll Sports Med. 2019;4(18):185–91.

extend the delivery of lifestyle interventions in patients with complex conditions and/or multimorbidity; (b) build leadership skills to manage clinical personnel and create a culture of excellence within their future organizations; and (c) prepare students to understand the foundations of creating business plans and proposals and managing a clinical program. As a whole, elevating the professional expectations of CEPs will contribute to the collective efforts in restoring the CEPs' autonomy within clinical settings, increasing areas and opportunities for employment and serving as the primary professionals that deliver exercise interventions in all health care settings.

- 11. Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callasway CW, Carson AP, Chamberlain AM, Chang AR, Cheng S, Das SR, Delling FN, Djousse L, Elkind MS, Ferguson JF, Fornage M, Jordan LC, Khan SS, Kissela BM, Knutson KL, Kwan TW, Lackland DT, Lewis TT, Lichtman JH, Longenecker CT, Loop MS, Lutsey PL, Martin SS, Matsushita K, Moran AE, Mussolino ME, O'Flaherty M, Pandey A, Perak AM, Rosamond WD, Roth GA, Sampson UKA, Satou GM, Schoreder EB, Shah SH, Spartano NL, Stokes A, Tirschwell D:, Tsao CW, Turakhia MP, VanWagner LB, Wilking JT, Wong SS, Virani SS; American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2019 update: a report from the American Heart Association. Circulation. Mar 5 2019;139(10):e56–528.
- Ades PA, Keteyian SJ, Wright JS, Hamm LF, Lui K, Newlin K, Shepard DS, Thomas RJ. Increasing cardiac rehabilitation participation from 20% to 70%: a road map from the Million Hearts Cardiac Rehabilitation Collaborative. Mayo Clin Proc. 2017 Feb;92(2):234–42.
- Rocca WA, Boyd CM, Grossardt BR, Bobo WV, Rutten LJF, Roger VL, Ebbert JO, Therneau TM, Yawn BP, St Sauver JL. Prevalence of multimorbidity in a geographically defined American population: patterns by age, sex, and race/ethnicity. Mayo Clin Proc. 2014 Oct;89(10):1336–49.
- Kaminsky LA, Thur LA, Riggin K. Patient and program characteristics of early outpatient cardiac rehabilitation programs in the United States. J Cardiopulm Rehabil Prev. 2013 May-Jun;33(3):168–72.
- Centers for Disease Control and Prevention. National diabetes statistics report, 2017. Atlanta (GA): Centers for Disease Control and Prevention, US Department of Health and Human Services; 2017.
- American Heart Association. Prevention and treatment of diabetes—work with your healthcare team. https://www.heart. org/en/health-topics/diabetes/prevention-treatment-of-diabetes/ work-with-your-health-care-team. Updated 2020. Accessed July 16, 2020.
- Laddu DR, Ozemek C, Hauer TL, Rouleau CR, Campbell TS, Wilton SB, Aggarwal S, Austford L, Arena R. Cardiometabolic responses to cardiac rehabilitation in people with and without diabetes. Int J Cardiol. 2020;301:156–62.