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Preparing Future Educators: Increase Teacher Efficacy Through the Physician Educators Certificate Program

Introduction

Residents and fellows play a vital role in educating medical students and junior residents. In many situations, residents do the majority of teaching and have significant interactions with medical students (Ng, Burke, and Narula, 2013). Given such critical teaching responsibilities, residents without formal teaching training would likely be limited in their abilities to educate others. Achkar et al. published a study in 2017 in which 221 program directors (PDs) interviewed reported they believe residents desire formal instruction in teaching. In other studies, it was reported that PDs want formal training programs to develop resident teaching skills (Morrison et al. 2001), and that residents themselves desire to improve teaching (Wachtel et al. 2013), are willing to teach, acknowledge the importance of their teaching role, but lack the confidence to teach effectively (Busari et al. 2002). Additionally, residency programs must meet the Liaison Committee on Medical Education (LCME) and the Accreditation Council for Graduate Medical Education (ACGME) requirements to prepare residents in the teaching and assessment of medical students. With this impetus, the Physician Educators Certificate Program (PECP) was created at McGovern Medical School (MMS) at UTHealth Houston in 2016, for interested residents. Currently, most residents-as-teachers' programs described in the literature are held sporadically as retreats, conducted within a single department, given as electives, include 15 or fewer participants, feature little standardization or established curriculum, and/or are usually delivered in lecture formats (Bing-You 1993; Hill et al. 2009; Ricciotti et al. 2012; Gear et al. 2019). PECP is a comprehensive eight-month program that not only fulfills accreditation requirements but also develops resident teaching skills, with the goal of providing

tools to teach effectively with confidence. As documented in the literature, with developed skills and confidence in teaching, residents tend to have higher job satisfaction as academicians (Rubak 2008). The program also prepares and supports residents with academic career aspirations by introducing them to evidence-based teaching principles they can apply in their academic positions.

Self-efficacy is a “task-specific” confidence that individuals possess and has consistently been shown to be positively associated with general academic achievement (e.g., Pajares 1996; Jackson 2002,). It is also highly associated with effort, willingness to seek support and strategies, and persistence in the face of difficulty (Bandura 1982). Teacher efficacy is the belief/confidence individuals have about their capabilities to teach effectively (Tschannen-Moran 1998). In the teacher education literature, efficacy beliefs of novice teachers have been found to be negatively associated with stress but positively related to enthusiasm, persistence, commitment, and teaching satisfaction (Burley et al. 1991; Tschannen-Moran et al, 2001). Although the construct has generated extensive lines of research connecting to performance, persistence, and emotions in the kindergarten through high school literature, teacher efficacy has not been examined in the medical education literature.

Teaching, associated with public speaking, may challenge residents, when they lack training. Those who have low teacher efficacy may associate teaching with risking embarrassment and worry about receiving negative teaching evaluations. As residents are asked to teach in the classroom or lead the team with patients alongside, how well they teach is transparently observable to the public. Residents’ confidence in their teaching effectiveness can be swayed through observations of how their peers perform or by their perceptions of how others might judge them. Even seasoned educators must contend with self-judgments of their ability to

teach effectively or to express adequately what they want to say. As we have seen, residents state their lack of confidence in teaching but such beliefs about their lack of teaching abilities could be enhanced through skill adoption. Given the importance of this belief and the benefits it reaps, the goals of PECP are to develop not only competent teaching residents, but also confident educators willing to commit to teaching, attempt new teaching strategies, persist in the face of challenge, and finally perhaps, experience greater job satisfaction.

The purpose of this study is to assess the effectiveness of PECP in preparing residents to teach with confidence. Effectiveness of the program include an increase in residents' teacher efficacy after completing the program, high endorsement of usefulness of the in-person workshops, and incorporation of teaching principles and learning theories in their teaching philosophies.

Methods

Development of the Physician Educators Certificate Program

In 2015, the program developer conducted a systematic review of the literature related to evidence-based teaching practices and identified 12 targeted teaching skills appropriate to develop effective medical educators (Julian et al. 2007; Berger et al. 2012; Smith et al. 2014). Topics included small and large group teaching strategies, evaluation of learners, providing effective feedback, and bedside teaching techniques, to name a few. A needs assessment was sent to residency and fellowship program directors (PDs) at MMS to determine the preferred program length (number of months and hours), the best time to hold workshops, and the skills that residents need for their development as effective educators based on the 12 targeted teaching skills. Based on PD recommendations, sessions offered during the noon hour were optimal. Eight teaching topics were identified as most relevant.

Description of the Physician Educators Certificate Program

Residents interested in enhancing their teaching quality may apply for the program with a letter of support from their PD ensuring protected time to fulfill PECP requirements. In addition, residents submit an application inclusive of a curriculum vitae and a teaching philosophy statement.

There are eight face-to-face interactive sessions (beginning in September and ending in May), and residents are assigned reading and short videos to watch in advance. Class time is used to discuss the topic of the month, share teaching experiences and lessons learned, discuss concerns, and address challenges. Based on program evaluation results from participants, new session topics were added to reflect residents' teaching needs and interests. Currently the eight one-hour workshop topics include: Curriculum Design: Writing Effective Goals and Objectives, Flipping Your Class with In-class Activities, Enhancing Your PowerPoint Slides, Providing Constructive Feedback and Meaningful Narrative Evaluation, Principles of Effective Teaching, Bedside Teaching Tips, Understanding Learners' Motivation, and Reflection as a Learner and Educator.

Graduation requirements include: 1) attending six out of eight workshops, 2) inviting peers to observe their teaching on two occasions and writing two reflection papers based on feedback received, and 3) submitting a revised teaching philosophy incorporating learning theories and teaching principles explored during the eight months. Upon completion, residents receive a PECP Completion Certificate through the Office of Educational Programs to add to their educator portfolio.

For this study, residents were asked to voluntarily complete two anonymous surveys, one prior to the start of the program and another at the completion of the program. The pretest was a

survey that included demographic questions and eight questions depicting teacher self-efficacy on a Likert scale developed for this study and not validated (ranging from 1=strongly disagree to 5=strongly agree). Efficacy scales involve questions specific to one’s confidence to master a certain teaching skill as recommended by Bandura (Bandura 1982). Items included in our teacher self-efficacy scale are “confidence in providing effective feedback”, “confidence in teaching effectively at the bedside”, “confidence in presentation skills”, to name a few. The posttest was a survey that included the same teacher self-efficacy scale and program evaluation questions. Questions included their perceptions of program worth and whether the program enhanced teaching skills. We also share excerpts from participants’ revised teaching philosophy to illustrate adoption of new teaching beliefs, attitudes, knowledge, and behaviors. All data gathered are approved by the Committee for the Protection of Human Subjects -IRB at UTHealth (HSC-MS-16-0806).

Of the 182 residents from four cohorts (2016-2019), five dropped out of PECP due to conflicts in clinical duties preventing them from attending monthly sessions; 170 completed the pretest survey and 167 completed both the pre and post surveys (92% response rate). The participants represented 16 residency programs. Table 1 shows the demographic information of the four cohorts excluding those who dropped out of the program and Table 2 displays background information from the pretest.

Table 1. Demographics of 2016-2019 Cohort (Total n = 177)

Cohort Year	N
2016-2017	35
2017-2018	37
2018-2019	43
2019-2020	62
PGY Level	
1	23
2	43
3	44

4	27
5	24
6	16
Gender	
Male	70
Female	107
Residency Programs Participated in PECP	
Anesthesiology	1
Cardiology	5
Diagnostic and Interventional Imaging	1
Emergency Medicine	5
Family Medicine	16
Hematology-Oncology	2
Internal Medicine (General and Pulmonary Critical Care)	44
Obstetrics and Gynecology (Maternal Fetal Medicine)	2
Neurocritical Care	1
Neurology (Adult Neurology, Child Neurology, Vascular Neurology)	9
Orthopedic Surgery, Orthopedic Trauma	3
Pathology and Laboratory Medicine	6
Pediatrics (General, Neonatal-Perinatal Medicine, Pediatric Gastroenterology, and Pediatric Pulmonology)	33
Physical Medicine and Rehabilitation	11
Psychiatry and Behavioral Sciences	33
Surgery	5

Table 2 Pretest Demographics Questionnaire (Total n = 170)

Had formal training on teaching effectiveness	106 (62%)
Type of formal training experience	
Workshop	92 (86%)
Certificate Program	2 (2%)
Education Degree	6 (6%)
Others	6 (6%)
Had teaching experiences	151 (89%)
Years of teaching experiences	
Less than a year	27 (18%)
1-3 years	74 (49%)
4-6 years	47 (31%)
7-9 years	3 (2%)

Data was analyzed using SPSS® version 26 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) Paired-samples t-test was used to analyze pre- and post-teacher efficacy where a $p < .001$ was considered significant.

Results

From the results of the study using paired-samples t-test, we saw significant increase in residents' confidence in giving feedback [$t(166) = -22.62, p < .001$] and an increase in the implementation of interactive teaching methods [$t(166) = -21.53, p < .001$]. The specific area of greatest improvement was their confidence in teaching at the bedside [$t(166) = -23.98, p < .001$]. All measures of teacher efficacy had a statistically-significant increase from pre- to post-PECP experience, and anxiety about teaching decreased (refer to Table 3).

Table 3 Pre- and Post-Teacher Efficacy Results

Item	Pre PECP Mean (Std. Dv)	Post PECP Mean (Std. Dev)	Mean Difference	<i>p</i> Value
Providing Effective Feedback	2.22 (0.83)	4.25 (0.78)	-2.02	<.001
Bedside Teaching Skills	2.08 (0.75)	4.12 (0.86)	-2.04	<.001
Communicating Effectively with Challenging Learners	2.59 (0.89)	3.46 (0.94)	-0.86	<.001
Prepared to Teach Effectively	2.62 (0.90)	4.08 (0.78)	-1.47	<.001
Using Different Modalities to Engage with Learners	2.32 (0.83)	3.95 (0.76)	-1.62	<.001
Using Interactive Teaching Strategies to Motivate Learners	2.10 (0.80)	4.05 (0.78)	-1.95	<.001
Presentation Skills	2.93 (0.81)	4.13 (0.81)	-1.20	<.001
Anxiety About Teaching	3.99 (0.81)	2.01 (0.94)	+1.98	<.001

Overall, 98% believed PECP to be a worthwhile experience, 90% believed that participation in PECP enhanced their teaching skills, 84% reported feeling more confident in their teaching abilities after participation in PECP, and 77% reported they are likely to seek academic positions upon completion of their residency/fellowship program.

To illustrate that behavior changes occurred and new teaching strategies were adopted at the completion of the program, we reviewed residents' revised teaching philosophies. Through the teaching philosophy activity, residents documented acquisition of learning theories and teaching principles. Residents self-reported an increase in teaching competence through learners' feedback to them and students complimenting them on their teaching enthusiasm. They also felt more competent in using new teaching strategies and found communication with students to be easier. Examples of terms that they included in their teaching philosophies are the use of "One-minute preceptor model" for teaching at the bedside, more incorporation of "flipped classroom" during journal clubs, integration of "motivation theories" when providing learners "concrete feedback," by introducing to learners the concepts of "fixed and growth mindsets" and using elements discussed in class to provide meaningful narrative evaluations. Residents mentioned acknowledging the importance of "activating learners' prior knowledge" so that new information can be acquired smoothly. One resident stated in her writing, *"This group responded well overall to the use of images to teach (radiographic findings and EEG are better taught with images than with text blocks) and I had great participation with people shouting out the answers they knew. This encouraged me to implement more active learning strategies in the future."* Another resident stated that he changed the way he taught by *"inserting quiz questions between topics of the lecture to intermittently have "attention checkpoints."* *"I've incorporated group activities in my sessions, even during Grand Rounds. Based on social constructivist theorists, people learn through interaction and communication. Knowledge can be built more effectively when there are discussion-based."*

One resident summarized her experience by stating, *"It is rewarding to see students and residents thrive and be able to progress in their own training as a result, in part, of the teaching*

I provided. Additionally, I always welcome direct feedback about my teaching abilities. Medicine is a collaborative effort with a common goal of helping people. Effective teaching allows our field to progress so that we can best serve our patients and the community.”

Discussion

The goal of this study was to address gaps in the literature by examining the residents’ teacher efficacy beliefs upon completion of the Physician Educators Certificate Program. Given the results of this study: increase in participants’ teacher efficacy and overall confidence in their teaching after completion of the program, belief that PECP was a worthwhile experience, and incorporation of learning theories in their teaching philosophies, we believe that the goals of PECP have been achieved. Aforementioned, researchers suggest that educators with high teacher efficacy are more willing to try new teaching strategies and persist when there are challenges. Participants who have gone through the program may engage in these positive behaviors and be able to apply teaching strategies throughout their academic careers having greater teaching satisfaction. The results of this study suggest that residents’ teaching efficacy, theoretical knowledge, and effective teaching behaviors could be improved through longitudinal programs with formal teaching curriculum like this one and could be incorporated at other institutions.

A significant strength of this program is that it is longitudinal in nature. Literature findings suggests that longitudinal programs may be needed to develop residents as educators. An eight-month program such as this allows for continuity of discussions on curated teaching topics, time to build and practice new teaching skills, and time for varied reflections on teaching experiences. With frequent meetings, the cohort developed a bond quickly and fostered a safe learning environment where challenges and concerns could be discussed. As documented in the literature, many teaching workshops are delivered within a single department for reasons such as

program-specific interest, convenience, and time constraints. An advantage of having a multidisciplinary program like this one is that it allows for standardization of teaching methods across residency programs, peer support for residents from departments where teaching might be less valued, and fruitful conversations and sharing of teaching experiences in different teaching environments.

PECP workshops are taught by both doctorate level education consultants (e.g., PhD/EdD educators) and physicians (MD/DO) on relevant topics, which is not typical in the literature. While physicians share clinical teaching strategies, PhD/EdD educators bring a wide range of evidence-based learning theories to share and demonstrate interactive teaching strategies during the sessions. Innovative aspects of this program are the required assignments: peer observation of teaching, writing reflection papers on teaching experiences, and crystallizing a teaching philosophy. These assignments allow participants to develop awareness of changes in their philosophy and teaching practices and give residents opportunities to be mindful about the formation of their professional identity as an educator.

There are limitations in our study. Applicants are self-selected into the program and are motivated to learn, resulting in selection bias. Another limitation to the study is the lack of a control group with which to compare results. We were not able to use residents' teaching evaluations to demonstrate teaching effectiveness. Overall, residents' teaching evaluations have been high. With such a ceiling effect, we did not find statistically-significant increases in their teaching evaluations from before to after enrollment in PECP.

Due to concerns of the spread of COVID-19, UTHealth Houston altered all in-person education to remote learning. As a result, the current fifth cohort attend PECP sessions through live WebEx meetings. With no limitations in seating capacity, we accepted 97 participants from

26 Residency Programs. We hope to report the outcomes of PECP effectiveness given this platform of interaction and also conduct a follow-up study to report PECP graduates' career choices.

Declaration of interest: The authors report no declarations of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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