INNOVATIONS

Mentoring Fellows into Career Educators through a Multispecialty Clinician-Educator Course

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ABSTRACT

Background: Subspecialty fellows are a unique group of trainees for whom there currently exist few opportunities to pursue formal training as clinician-educators, as singular fellowship programs often face significant obstacles to implementing such coursework.

Objective: To develop, implement, and assess a clinician-educator course for fellows from multiple subspecialty fellowships at a single large academic medical center.

Methods: Our course, entitled Fellow as Clinician-Educator, was initiated across numerous fellowship programs from August 2021 to April 2023 at University of California San Diego Health. The synchronous component of the curriculum included four half-day workshops targeting various clinician-educator subcompetencies. The course also included ongoing educational opportunities, longitudinal mentorship, and a medical education capstone project. Measures with pre and postcourse knowledge assessments and surveys were performed to evaluate the course's impact in this prospective observational cohort.

Results: Forty-six fellows enrolled in the course. Overall, there was statistically significant improvement in learners' confidence across 16 of 18 clinician-educator skills surveyed ($P < 0.05$). Participants demonstrated improvement in nine core topics for

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clinician-educators, achieving statistical significance for feedback ($P = 0.0058$), lecture slide design ($P = 0.0006$), and multimedia design principles ($P = 0.0416$). The course facilitated medical education scholarship in the form of 4 grant submissions, 7 manuscripts, 27 presented abstracts, and 24 curricular innovations.

Conclusion: Implementation of a multispecialty clinician-educator course for subspecialty fellows is feasible, effective, and facilitates academic scholarship in medical education. Such programs may also serve to circumnavigate many challenges that single fellowship programs face when attempting to pursue their own directed clinician-educator courses.

Keywords:
medical education; fellowship and scholarship; teaching

By definition, teaching is a foundational component of the clinician-educator's role in medical society. As the role of clinician-educator has become increasingly recognized throughout the United States, its key competencies have become better delineated and are currently divided into four overarching domains: administration; educational theory and practice; well-being; and diversity, equity, and inclusion (1, 2). Each of these is then further subdivided into more specific subcompetencies such as leadership skills, professionalism, program evaluation, and remediation, among others. However, formal or specific instruction targeting these core concepts is frequently lacking or nonexistent at the level of postgraduate clinical training. Consequently, academic teaching faculty members often find themselves expected to have mastered these educational skill sets despite insufficient guidance or preparation to develop such expertise.

There has been a growing effort among residency training programs across the United States to formalize the metacognitive process of teaching clinician-educators how to teach. Many have expanded their focus on medical knowledge and patient care to include these educational competencies. Clinician-educator tracks for residents and resident-as-teacher curricula are gaining popularity (3) and have been described in various specialty training programs, including internal medicine (3, 4), psychiatry, pediatrics, emergency medicine, radiology (5), neurology, and family medicine (6, 7). These tracks have been successful and shown to increase the number of educational activities led by participants as well as their overall academic productivity (8).

Although there has been significant effort dedicated to preparing residents for careers as clinician-educators, this work has not been developed in fellowship training. Because fellows work in close proximity to learners, fellowship remains a crucial time to continue to develop effective teaching skills. However, fellows, in the final stages of their formal academic training, have their own distinct needs and goals with regard to developing their educational skills. Guidance focused on transitioning to practice and navigating clinician-educator careers are pivotal in bridging this gap. Academic institutions need dedicated curricula in medical education to ensure the effectiveness of their fellows' teaching abilities and to optimally position these rising faculty members for success in their future careers (9).

Despite a demonstrated need for programs of this nature (10, 11), there remains a shortage of clinician-educator tracks for fellows. In a recent scoping review, only 13% of clinician-educator tracks targeted fellows, and these curricula were limited to a few subspecialty fields such as pulmonary and critical care medicine (12), geriatrics, and gastroenterology (6). Implementing medical education training may be challenging within a single fellowship program as a result of limited resources, small program size, and lack of faculty with formal training in medical education. Alternative approaches have been explored to address these obstacles, including one-time workshops or educator training sessions at annual society meetings (13). Although feasible, these strategies are lacking in opportunities for continuity, longitudinal growth, and mentorship. To address these gaps and limitations, we created a longitudinal clinician-educator course across multiple subspecialties and hypothesized that involvement in this comprehensive curriculum would improve confidence in and knowledge of clinician-educator skills.

METHODS

Study Design

This was a prospective observational cohort study assessing the impact of an integrative clinician-educator course on fellows from different subspecialties between August 2021 and April 2023 at University of California (UC) San Diego Health. The study was determined to meet exemption status by the institutional review board (exemption no. 801912).

Study Population

Subspecialty fellows enrolled in a fellowship training program at UC San Diego were eligible to participate in the course. During the 2021–2022 academic year, fellows from the infectious disease, pulmonary and critical medicine, and geriatrics fellowship training programs were invited to enroll in a pilot of the curriculum. Selection of these particular fellowships for the pilot was based primarily on trainee interest levels collected informally during the development phase. Among the three programs, 13 of 34 fellows enrolled. During the 2022–2023 academic year, invitation was extended to all fellows at the institution, with 33 enrolling across 16 of the 103 total fellowship programs.

Needs Assessment

The course was developed using the Kern model for curriculum development (14). A targeted needs assessment was performed among UC San Diego subspecialty fellows and fellowship program directors within the department of medicine using a modified two-round Delphi model (15–17). Eleven of 17 program directors responded, with 72% reporting that their specific fellowship curriculum lacked any formal training in medical education for clinician-educators. Twenty-eight of 118 fellows also responded, with 89% noting that a formal curriculum would be valuable and expressing interest in participating if one were offered. The needs assessment also provided input on the structure of the course, revealing that 50% of program directors and 64% of fellows preferred one day of class per week or month to accommodate their other clinical responsibilities. More specifically, program directors reported interest in scholarship and formal didactics addressing various teaching skills. The responses from fellows concurred and additionally identified a desire for training on leadership, mentorship, and communication skills.

Curriculum Development

Using the results from our targeted needs assessment, we developed and implemented our course, entitled Fellow as Clinician-Educator (FACE), for subspecialty fellows at UC San Diego. The primary goal of the course is to provide training, skill development, and mentorship for fellows interested in pursuing a career as a clinician-educator. This curriculum was designed to specifically focus on two of the four domains of clinician-educator competency: *1*) administration and *2*) educational theory and practice. To achieve this, 16 hours of synchronous didactic and small-group learning sessions were implemented during four half-days near the beginning of the academic year. Course topics were selected considering needs assessment results and are comprehensively listed in Table 1 along with associated domains and subcompetencies (2) for each. The course also included hands-on workshops to practice and develop teaching skills as well as to construct an educator's portfolio. The lecturers and facilitators for these sessions included known clinician-educators across multiple subspecialties; furthermore, many held educational leadership positions at UC San Diego (e.g., fellowship program director, clerkship director, preclinical course director, assistant dean of the medical school).

Following the synchronous component of the curriculum, fellows applied their knowledge and skills by participating in a variety of teaching settings (large-group lecture, small-group facilitation, and clinical teaching). Fellows were partnered with clinician-educator faculty members who provided one-on-one mentorship for these teaching activities, including guidance, assistance, and feedback over multiple interactions. Additionally, fellows had the opportunity to attend monthly medical education grand rounds and journal clubs provided by UC San Diego's Center for Faculty Development. In the second year of the course, fellows were required to complete a medical education capstone project in one of three areas: medical education research, medical education innovations, and medical education visual abstracts. Fellows presented their projects at a research symposium at the conclusion of the academic year.

Data Collection

Pre- and postcourse surveys were performed anonymously using an online secure resource (qualtrics.com). Fellows' confidence in their clinician-educator skills was assessed using a five-point Likert-like scale (1, extremely confident; 5, not at all confident) before and approximately 1 week after the conclusion of the course. Multiple-choice questions were used to appraise knowledge of core medical education topics before and after the course as well (*see* data supplement for pre- and postcourse surveys). Because the course content was modified and expanded between Year 1 and Year 2, some of the survey items were included in only the second year. Survey items were developed according to best practices in health professions education survey design (18) and were reviewed and edited by faculty members in the course. We also measured fellows' academic productivity and scholarship based on self-reported numbers of abstracts, national presentations, and manuscripts submitted and accepted for publication.

Statistical Analysis

Stata/IC version 28.0 (StataCorp) was used for statistical analyses, with $P < 0.05$ considered significant. The five-point Likert scale items assessing confidence in

Table 1. FACE course educational modules

Competency/ Subcompetency Domain	Courses	Learning Objectives
Administration		
Leadership skills	• Leadership in health care and medical education	• Identify leadership qualities with a focus on health care and medical education • Examine our own approach to conflict • Recognize the difference between leadership and titles in academic health care
Learning environment	• Curricular design	• Apply at least one of the steps in Kern's model to a proposed curriculum • Identify common pitfalls in curriculum development • Classify curriculum evaluation measures using the Kirkpatrick model
Educational theory and practice		
Feedback	• Feedback in clinical settings	• Recognize qualities of effective feedback and barriers to delivering effective feedback • Describe practical ways to improve feedback in the clinical setting • Identify one new skill to incorporate when delivering feedback
Scholarship	• Critical appraisal of medical literature	• Demonstrate the ability to conduct a literature search related to a specific topic • Describe the steps required to perform a critical analysis and review of a journal article • Translate a critical analysis and review of a journal article into a journal club presentation
	• Pursing medical education scholarship	• Describe three catalysts for success in publishing • Review tools and resources to convert your ideas into meaningful scholarly outputs
Teaching	• Innovative teaching methods	• Understand how to incorporate standardized patient methodology into simulation curriculum • Learn how to design high- and low-fidelity scenarios • Review the basics of debriefing • Have awareness of various methods to incorporate telesimulation into simulation curricula
	• Being an effective lecturer	• Recognize why and how lectures are used • Identify main factors contributing to success and failure of lectures • Recognize key components to consider when creating a lecture • Use PowerPoint and presentation pearls • Identify steps and opportunities for improvement
	• Small group facilitation	• Define the key elements of small-group learning • Identify purposes of small-group learning • List three key roles of facilitators in small groups • Classify the phases of development within a small group • Recognize common problems in small group dynamics
	• Teaching at bedside	• List some of the challenges of teaching on the wards • Structure your time and your learners' time to optimize space for teaching • Compare and contrast teaching at the bedside vs teaching in a conference room • Create a "one teaching point per patient" list that includes teaching/modeling all six ACGME competencies

Table 1. *Continued*.

Competency/ Subcompetency Domain	Courses	Learning Objectives
	• Teaching in clinic	• Devise a plan for dividing patients between yourself and the learners in your clinic • Develop methods that will help you fulfill your responsibilities as a clinician and an educator in the clinic • Create a to-do list of materials that will allow you to precept clinic effectively and efficiently
	• Procedural instruction	• Compare and contrast teaching procedural strategies in different settings • Identify the three main components of skill competency • Identify the six-step approach to teaching a clinical skill • Review in depth the approach to teaching procedures before, during, and afterward • Brainstorm ways to provide feedback as a group
Science of learning	• Medical education learning theory	• Describe common learning theories and how they apply to medical education • Compare the situational advantages of different learning theories • Explain how their preferred teaching methods reflect how they believe students/trainees learn best
	• Clinical reasoning and its instruction	• Describe the core concepts of diagnostic reasoning as they apply to subspecialty medicine • Differentiate between two main types of consult questions as they relate to clinical reasoning • Use problem representation as a tool for defining a consult question and activating illness or management scripts • Describe subspecialty bias and how to avoid it • Develop tools for progressive problem solving
	• Communication skills and styles	• Understand personal communication preferences and impact on others • Understand behavior of others • Become more flexible and adaptable in your communication with others
Learner professional development	• Development of teaching portfolio	• Identify the distinctions between an education portfolio and a *curriculum vitae* • Review the components of a teaching portfolio • Acquire the tools necessary to start a teaching portfolio
	• Professional advancement	• List the domains in which clinician-educators are evaluated for promotion in academia • Give and receive feedback on your academic *curriculum vitae*
	• Career success as clinician-educator	• Understand some of the most common clinician-educator career pathways • Discuss the key skill sets required to maximize chances for success • Explain the rationale and steps required to generate a high-quality narrative review article

Definition of abbreviations: ACGME = Accreditation Council for Graduate Medical Education; FACE = Fellow as Clinician-Educator.

medical education skill ability were dichotomized; participants who selected moderately confident, somewhat confident, or not at all confident in their ability were compared with participants who selected very confident or extremely confident in their ability. Multiple-choice questions assessing knowledge were analyzed as dichotomized variables (correct or incorrect). Differences were assessed using paired two-tailed *t* tests.

RESULTS

Pre- and postcourse surveys were completed by 11 of the 13 fellows during Year 1 and 18 of 33 fellows during Year 2 (with an overall survey response rate of 63%). All 29 respondents (100%) stated that they would recommend this course to other fellows.

Regarding clinician-educator skills, fellow confidence according to precourse survey results was lowest concerning the application of adult learning theory to teaching, with only 5.5% feeling very or extremely confident on the five-point Likert scale in their ability to do so (Table 2). Other categories that scored lower by the same scale included giving feedback in the clinical setting (10.3%) and achieving success as a clinician-educator (10.3%). Precourse fellow confidence was highest for teaching in the inpatient setting (34.4%), leadership ability (34.4%), and understanding the communication styles of others (34.4%). The proportion of fellows who reported feeling extremely or very confident in their clinician-educator skills increased significantly ($P < 0.05$) after completing the course with regard to all skills except for simulation design and effective procedural teaching (Table 2). Fellows gained the most confidence in developing learning objectives (+72.2%; $P = 0.0001$), creating an effective "chalk talk" (+69.0%; $P = 0.0001$), developing their academic *curriculum vitae* (+66.7%; $P = 0.0002$), and giving feedback in the clinical setting (+65.5%; $P = 0.0001$).

Precourse survey data further demonstrated a high degree of core concept knowledge at baseline, but this level of knowledge was lower for questions related to adult learning theory, communication styles, lecture design, and small-group facilitation strategy (Table 3). Postcourse survey data again demonstrated knowledge increases across all domains, with statistically significant improvements in feedback ($P = 0.0058$), lecture slide design ($P = 0.0006$), and multimedia design principles ($P = 0.0416$).

Capstone projects were completed and presented by 19 of the 33 participants during the second year of the program. Although this curricular component was not implemented during the pilot year, Figure 1 shows the combined medical education–specific scholarship produced by the 46 fellow participants across both years of the FACE course. Including the capstone projects, this amounted to a total of 4 submitted grants, 7 manuscripts submitted to peer-reviewed journals, 24 curricular innovations, and 27 abstracts presented at conferences ranging from local to national meetings.

DISCUSSION

Medical centers nationwide have grown to acknowledge that a successful academic clinician must not only excel at patient care, but should also be an effective educator. Accordingly, the clinician-educator career path has been recognized as a field requiring specific expertise and specialization distinct from that for physician-scientist and other pathways. Thus, efforts have been made to provide pedagogy on how to teach. Despite this increasing demand for tutelage in medical education, subspecialty fellowship training programs have remained limited in

Table 2. Change in participants' confidence in medical education skill ability: Pre and postcourse survey results

Clinician-Educator Skill	Pre-Survey (%)	Post-Survey (%)	Change (%)	*P* Value
Giving an effective lecture	27.5	75.8	+48.3	0.0001
Facilitating small group learning	24.1	58.6	+34.5	0.0006
Creating an effective chalk talk	17.2	86.2	+69.0	0.0001
Delivering an effective chalk talk	16.7	83.3	+66.7	0.0001
Developing high-quality learning objectives	11.1	83.3	+72.2	0.0001
Teaching effectively in clinic	27.5	68.9	+41.4	0.0014
Teaching procedures effectively	27.7	50.0	+22.2	0.2151
Teaching in the inpatient setting	34.4	75.8	+41.4	0.0029
Ability as a leader	34.4	62.0	+27.6	0.0180
Understanding others' communication styles	34.4	79.3	+44.8	0.0007
Adapting your communication style	27.7	72.2	+44.4	0.0278
Applying adult learning theory to your teaching	5.5	55.5	+50.0	0.0007
Designing curricula using Kern's model for curriculum development	16.7	66.7	+50.0	0.0007
Design simulations	22.2	50.0	+27.8	0.1355
Giving feedback in the clinical setting	10.3	75.8	+65.5	0.0001
Achieving career success as a clinician-educator	10.3	68.9	+58.6	0.0001
Developing an academic *curriculum vitae*	11.1	77.8	+66.7	0.0002
Developing an educator's portfolio	11.1	44.4	+33.3	0.0096

their ability to offer high-quality training in this area (3, 6).

Most clinician-educator programs aim to train learners in a systematic approach to leadership, curriculum development, and educational scholarship. Despite these consistent goals and guidelines for best practices in clinician-educator track creation (15), programs vary substantially and are often not standardized even within institutions (3, 19, 20). Participant eligibility criteria, session timing and duration, instructional format, methods of evaluation, and even core topics differ greatly among these courses (3, 20). Given the challenges in developing a clinician-educator program in general, there is interest in developing a national clinician-educator program or, on a smaller scale, creating clinician-educator programs that are not limited to one discipline within a single institution (20, 21). For example, the University of Chicago Pritzker School of Medicine created a graduate medical education scholars track, which was open to trainees in 22 of its residency programs (21). However, a

Table 3. Change in participants' medical education knowledge before and after the course

Question Topic	Before (%)	After (%)	Change (%)	*P* Value
Adult learning theory	27.8	44.4	+16.6	0.0827
Learning objectives	50.0	66.7	+16.7	0.1872
Feedback	58.6	82.7	+24.1	0.0058
Academic *curriculum vitae*	72.4	89.6	+17.2	0.0572
Communication styles	37.9	55.2	+17.3	0.0961
Strategies to facilitate small groups	41.3	58.6	+17.3	0.0572
Lecture slide design	20.7	55.2	+34.5	0.0006
Multimedia design principles	66.7	88.8	+22.1	0.0416
Curriculum development	50.0	77.8	+27.8	0.0560

clinician-educator track for residents may not be completely applicable for fellows. The FACE program at UC San Diego targeted fellows exclusively, without the need for additional years of training—key features that make it unique among clinician-educator programs offered across the nation. Although our learners spanned various backgrounds and clinical interests, their commonality as fellows presented the opportunity for our program to incorporate content unique to their training-level needs.

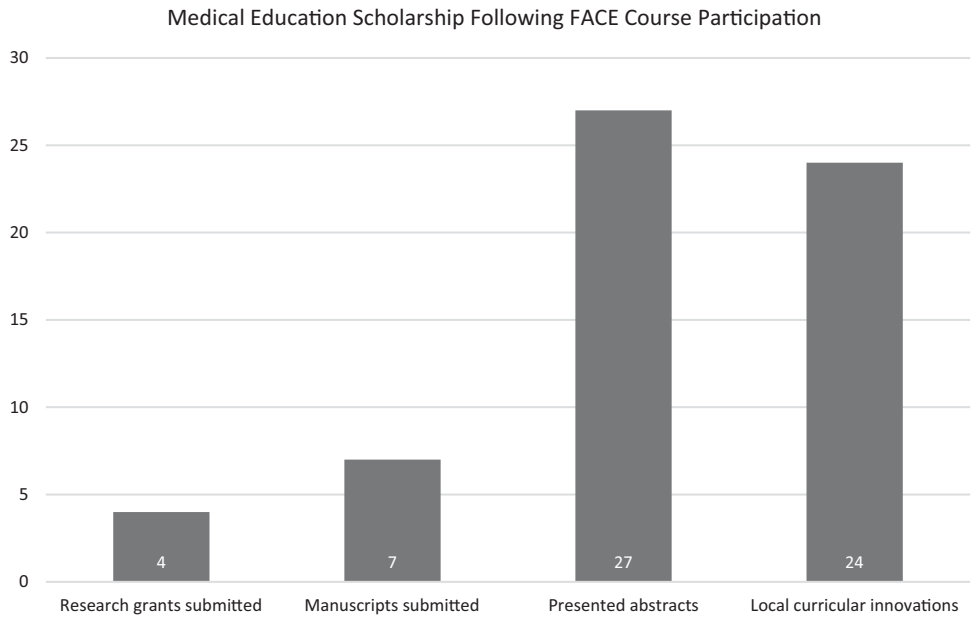

Figure 1. Scholarship specific to medical education produced by the 46 fellow participants across both years of the Fellow as Clinician-Educator course. Included are research grant submissions; manuscripts published in or submitted to peer-reviewed journals; curricular innovations instituted at the University of California, San Diego; and all abstracts presented at local, regional, or national conferences. FACE = Fellow as Clinician-Educator.

Thus, >20% of the sessions in our course were directed at specific postgraduation topics such as the transition to practice and career advancement in academic medicine as a clinician-educator. Our multispecialty fellows' clinician-educator curriculum functioned to conglomerate the resources and needs of its participants across multiple subspecialty training programs, while using accepted and well-defined domains of educator competence (2) and incorporating content targeted specifically to this distinct stage in their careers.

Clinician-educator programs as a whole have been shown to increase learner confidence and knowledge (6, 22, 23). Our course was evaluated for these outcomes as well through pre- and postcourse survey data using the Kirkpatrick evaluation model (24). We collected participant reactions (level 1) and evidence of knowledge growth (level 2), demonstrating statistically significant improvements in both across multiple sets of skills and competencies. Survey responses further demonstrated that this course was well received, addressed an unfulfilled need for more specific educator training, and improved confidence in most core teaching skills. Course participants were also able to apply what they learned (level 3) through direct teaching following the synchronous component of the course and through medical education scholarship. In some cases, course participants were able to implement changes in their respective departments through the implementation of curricula or other teaching innovations (level 4). Although the effects of each of these curricular changes are currently being assessed, and are beyond the scope of this paper, we suspect that their innovation and implementation were tied to the coursework and mentorship provided by the FACE curriculum.

The major disadvantage of a course for participants from a wide array of fellowship training programs such as this one is the disparate schedule of clinical and research responsibilities. Although still achievable, this increased the complexity of identifying a time for the synchronous component of the course that worked for all subspecialty fellows. However, we believe these in-person group activities still provide tremendous benefits to participants. Notably, the greatest improvements in skill set confidence among our participants aligned with our sessions with substantial hands-on interactions, employing active learning to better foster critical thinking, adaptability, and interpersonal skills (25–27). Additional challenges presented largely in the asynchronous portion of the curriculum. With increasing numbers of participants in the second year of the program, it became more difficult to identify and recruit enough career clinician-educator faculty members to provide one-on-one longitudinal mentorship for each fellow. Greater enrollment also led to increased difficulty in implementing any actionable or coordinated follow-up beyond that individualized counsel. Fortunately, with each additional year, there are more graduates of our FACE program who may serve as mentors to future participants and grow the network of clinician-educators at this and other institutions.

There exist many barriers to the implementation and maintenance of clinician-educator programs or courses. Administrative requirements, lack of protected time for course faculty, and financial limitations are just a few of the obstacles to developing and sustaining these courses. In our experience, these limitations were better addressed by implementing a course that crossed multiple subspecialties and included course

faculty members from many different departments and divisions. Combining resources and faculty mentors across multiple training programs lowered many of the aforementioned hurdles while still providing clinician-educator training that resulted in significant improvements in perceptions, knowledge, and scholarly pursuits. Another benefit of the multispecialty course was that it allowed learners who may never otherwise interact an opportunity to meet and discover and hone their teaching skills together. In this setting, the fellows themselves bring a range of experiences that is far broader than can be provided in a singular training program, or even those from a department as large as medicine or pediatrics. Our course offered opportunities to engage in sessions specific to a fellow's needs while also providing coursework that allowed for someone like a surgical subspecialty fellow to simultaneously collaborate with a group of fellows who may be from, for example, cardiology, movement disorders, child psychiatry, and anesthesia critical care.

There are several limitations of our study that merit acknowledgment. This is a single-center study with a small sample size. This limits generalizability and may have impacted the statistical analyses. Because this was a voluntary course, the survey results may have been impacted because individuals with expertise and interest in teaching may have been more likely to participate in the course. It is also worth noting that our participants reported fairly low confidence in their medical education skills in presurvey data, with, at most, 34.4% stating they were very or extremely confident in any given skill set. Although the cause is uncertain, it is possible that this was a consequence of volunteer bias, with those enrolling doing so as a result of perceived limitations or self-doubt. This finding may also impact the overall degree of change in learner confidence before versus after the course. Future studies should consider measuring additional outcomes, such as other factors that impact baseline confidence, teaching performance evaluations, and more long-term impact of such curricula on their participants.

Despite these constraints, our FACE course was successfully able to demonstrate improvements in educator confidence, knowledge, and scholarly productivity across a wide range of subspecialty participants. We have shown that a multispecialty clinician-educator fellows' course is feasible, beneficial, and well-received, facilitating academic scholarship. Above all, it may serve as an ideal option for subspecialty fellowship training programs at other institutions.

Author disclosures are available with the text of this article at www.atsjournals.org.

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