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Outcome assessment of medical education fellowships in emergency medicine

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Abstract

Objectives: Medical education fellowships in emergency medicine (EM) provide training in teaching, assessment, educational program administration, and scholarship. The longitudinal impact of this training is unknown. Our objective was to characterize the career outcomes of medical education fellowship graduates.

Methods: We solicited curriculum vitae (CV) from graduates of U.S. EM education fellowships by email. We abstracted data from CVs with a standard instrument that included program characteristics, employment history, leadership positions, awards, and scholarly productivity. We calculated and reported descriptive statistics.

Results: A total of 71 of 91 (78%) graduates participated. Thirty-three completed a 1-year fellowship and 38 completed a 2-year fellowship. Nineteen (27%) completed an advanced degree during fellowship. Median (range) graduation year was 2016 (1997–2020). The majority, 63 of 71 (89%), work in an academic setting. Graduates held leadership positions in continuing medical education, graduate medical education, and undergraduate medical education. Forty-eight (68%) served on national medical education committees. The mean \pm SD number of national medical education awards was 1.27 ± 2.03 . The mean \pm SD number of national medical education presentations was 7.63 ± 10.83 . Graduates authored a mean \pm SD of 3.63 ± 5.81 book chapters and a mean \pm SD of 4.99 ± 6.17 peer-reviewed medical education research publications. Ten (14%) served on journal editorial boards, 34 (48%) were journal reviewers, and 31 (44%) had received a medical education grant.

Conclusion: EM medical education fellowship graduates are academically productive and hold education leadership positions.

INTRODUCTION

Medical education is a unique domain within higher education that is defined by distinct pedagogy, instructional techniques, and research methods. Fellowship programs in medical education provide medical educators with the necessary skills to advance

theory, practices, norms, and research agendas that further distinguishes and matures the field.^{1–4} Over 40 postgraduate medical education fellowships are available in emergency medicine (EM), and rigorous standards must be met by those programs that seek fellowship approval by the Society for Academic Emergency Medicine.^{4–7}

Advanced training in medical education promotes scholarly achievement and excellence in bedside teaching, which are both valued in the professoriate pathway for clinician-educator.^{1,8} However, most clinician-educators have less formal training and ill-defined expectations of scholarship compared to their faculty peers who conduct basic science or clinical research.^{2,3,8} Career accelerants that help increase academic productivity and achieve parity in promotion decisions for educators include career development programs, skills training, targeted faculty development, formative networking, relevant promotion processes, and junior faculty opportunities.⁹ The goals of these accelerants are replicated in postgraduate medical education fellowships.^{4,10} However, there have been no formal evaluations of these fellowships at the national level and it is unclear if these programs meet their stated goals or the expected rigors of training.

Prominent outcomes evaluation frameworks offer methods for appraising medical education fellowships and their impact on career in EM.^{11,12} These frameworks include Kirkpatrick's four levels of evaluation (reaction, learning, behavior, and results) and Moore's seven levels of outcomes (participation, satisfaction, learning, performance, patient health, and population health).^{11,12} Sadly, most evaluations of fellowship and junior faculty development programs have been limited to satisfaction questionnaires.¹³ Understanding and categorizing training outcomes beyond satisfaction is necessary to demonstrate the value of these programs to their sponsoring institutions, prospective fellows, employers, and educational administrators designing new fellowship programs. Meaningful outcomes can provide justification for annual budgets and other necessary program resources, allowing stakeholders a means of assessing return on their investment.^{14,15} Outcomes-based evaluations also collect important data that inform iterative refinement of curricula and a pragmatic understanding of the training needs of fellowship graduates.^{16,17}

This study had two goals. First, considering the Kirkpatrick and Moore frameworks, we sought to identify objective measures of career achievement in educational scholarship and leadership beyond the level of satisfaction for use in an outcomes-based evaluation of medical education fellowship programs. Second, we aimed to evaluate the impact of education fellowship programs by characterizing the careers outcomes of emergency physicians who completed this advanced training.

METHODS

Study design

We performed a descriptive, cross-sectional analysis of curricula vitae (CVs). We chose this method as CVs represent a single source that captures a variety of professional accomplishments. Additionally, we believed these data to likely be accurate and up to date as CVs are used in high-stakes assessments such as promotion. This study was approved by the institutional review board of the David Geffen School of Medicine at UCLA.

Study setting and participants

All graduates of EM medical education fellowships in the United States were eligible to participate in this study. We defined a medical education fellowship as a formal, structured, 1- or 2-year, postresidency experience providing participants with didactic and experiential training in educational methods, theories of learning, program administration, and scholarship. We identified U.S. EM medical education fellowships and contact information for fellowship directors through review of professional society fellowship directories, query of the Council of Residency Directors in Emergency Medicine list-serve, and review of individual program websites to ensure that all programs were captured.^{6,18,19}

We contacted fellowship directors to identify the names and email addresses of graduates from their program. One member of the study group (J.J.) then contacted all graduates by email and invited them to participate in the study by submitting their CV. The same author sent two follow-up invitations at weekly intervals to nonresponders. Study participants could elect to deidentify their CV themselves prior to submission. Any CVs that were submitted with identifying information were deidentified by J.J. prior to analysis. We collected data between July and August 2020.

Instrument development

Our study group of expert EM educators and education fellowship directors, many of whom had also completed an EM medical education fellowship, reviewed the literature including available medical education curricular guidelines to identify objective measures of career achievement in educational scholarship and leadership.^{4,7,10} We also considered items commonly assessed for promotion and tenure. We then applied this information to the development of our CV abstraction form to optimize content validity. The items on the abstraction form were read aloud among the study team and piloted with a small group of medical education fellowship directors and program leadership, using their own CVs as a substrate, to maximize response process validity. The final version of the abstraction form is available in Data Supplement S1 (available as supporting information in the online version of this paper, which is available at <http://onlinelibrary.wiley.com/doi/10.1002/aet2.10650/full>).

Study protocol

We divided deidentified CVs among five members of the study team (M.G., J.A., D.D., J.R., R.P.) for abstraction. These authors abstracted data from their assigned participant CVs using a standard form (Data Supplement S1). All abstractors participated in a 1-h training session prior to abstracting data. The session was led by J.J., who has advanced training in education research methods. The training session covered item and category definitions and instructions on data entry. Questions on content and process were solicited and

answered. Data abstracted included program characteristics, leadership positions, awards, scholarship, and grant funding. One member of the study team (J.J.) reabstracted a random 15% sample of CVs to assess inter-rater reliability.

Data analysis

We entered and compiled all data using Microsoft Excel and transferred to SPSS (IBM SPSS Statistics for Windows, Version 27.0) for analysis. We calculated and reported descriptive statistics. We used kappa to assess inter-rater reliability across all items of the abstraction form.

RESULTS

We identified a total of 45 medical education fellowship programs in EM in the United States as of May 2020. Of these, 41 (91%) fellowship directors provided rosters of their graduates. The total number of eligible participants was 91, of whom 71 (78%) submitted their CVs. Inter-rater reliability was good with kappa ranging from 0.74 (0.56, 1) to 1.00 (1, 1) for all outcome variables. Most respondents completed fellowship training within the past 10 years (median = 2016, range = 1997–2020), indicating a cohort early in their careers.

Slightly over half of the respondents completed 2-year fellowship programs (38/71, 54%). Many respondents completed a masters degree (33/71, 47%) and of those more than half did so concurrent with their fellowships (19/33, 58%). Of the degrees completed during fellowship, most were masters degrees in education-related fields (14/19, 74%). None of the participants had a doctorate of philosophy (PhD) or education (EdD). Many respondents (44/71, 62%) completed faculty development programs, including the American College of Emergency Physicians (ACEP) Teaching Fellowship (29/71, 41%), local institutional programs (25/71, 35%), Association of American Medical Colleges (AAMC) Medical Education Research Certification (15/71, 21%), Harvard Macy programs (4/71; 6%), and Academic Life in Emergency Medicine (ALiEM) Faculty Incubator (4/71, 6%;²⁰⁻²³ see Table 1 for complete details of participant training characteristics).

Graduates are employed in all regions of the United States and the majority (63/71, 89%) are currently working in academics. Academic rank ranged from clinical instructor to full professor with the majority (42/71, 59%) holding the rank of assistant professor. The mean ± SD years at rank for assistant professors was 4.26 ± 4.05 years. Most respondents were currently appointed to administrative roles in medical education (52/71, 73%), most commonly associate/assistant residency program directors (27/71, 38%). Consistent with the early career stage of the cohort, few participants currently held a decanal title (2/71, 3%) or were vice chairs of education (2/71, 3%). Table 2 displays characteristics of graduates' current employment.

TABLE 1 Respondent training characteristics

	n (%); Total n = 71
Duration of fellowship	
1 year	33 (46.4)
2 year	38 (53.5)
Region of fellowship	
West	40 (56.3)
Midwest	14 (19.7)
South	3 (4.2)
Northeast	14 (19.7)
Fellowship graduation year, median (range)	2016 (1997–2020)
Residency graduation year, median (range)	2015 (1996–2019)
Any advanced degree	33 (46.5)
Doctor of Philosophy (PhD)	0 (0)
Doctor of Education (EdD)	0 (0)
Master of Academic Medicine	4 (5.6)
Master of Advanced Studies in Clinical Research	2 (2.8)
Master of Arts in Education	2 (2.8)
Master of Business Administration	0 (0)
Masters of Clinical Research	2 (2.8)
Master of Education	3 (4.2)
Master of Health Professions Education	7 (9.9)
Master of Medical Education	3 (4.2)
Master of Public Health	3 (4.2)
Master of Science in Education	2 (2.8)
Other Masters degree	6 (8.5)
Completed advanced degree during fellowship	19 (26.8)
Master of Academic Medicine	4 (5.6)
Master of Advanced Studies in Clinical Research	1 (1.4)
Master of Arts in Education	2 (2.8)
Master of Clinical Research	1 (1.4)
Master of Education	2 (2.8)
Master of Health Professions Education	3 (4.2)
Master of Medical Education	2 (2.8)
Master of Science in Education	1 (1.4)
Other Masters degree	3 (4.2)
Faculty development programs completed	
MERC	15 (21.1)
ACEP Teaching Fellowship	29 (40.8)
Harvard Macy Professional development in medical education program	4 (5.6)
Stanford National Clinical Teaching Program	1 (1.4)
Local institutional faculty development program in medical education	25 (35.2)
ALiEM faculty incubator	4 (5.6)
Other	21 (29.6)

TABLE 2 Current positions of respondents

	n (%); Total n = 71
Current position^a	
Program director	6 (8.5)
Assistant/associate program director	27 (38.0)
Clerkship director	3 (4.2)
Assistant/associate clerkship director	4 (5.6)
Medical education fellowship director	8 (11.3)
Director of simulation	3 (4.2)
Vice chair of education	2 (2.8)
Assistant/associate dean	2 (2.8)
Core faculty	9 (12.7)
Other	23 (32.4)
Currently working in academics	
Yes	63(88.7)
No	8 (11.3)
Region of practice	
West	37 (52.1)
Midwest	14 (19.7)
South	3 (4.2)
Northeast	15 (21.1)
Other/unknown	2 (2.8)
Current academic rank	
Clinical Instructor	3 (4.2)
Assistant professor	42 (59.2)
Associate professor	8 (11.3)
Professor	3 (4.2)
Other/unknown	14 (19.7)
Number of years at rank (mean ± SD; n)	
Clinical Instructor	1.96 ± 1; 47
Assistant professor	4.26 ± 4.05; 54
Associate professor	3.64 ± 2.84; 11
Professor	8.67 ± 1.15; 3

^aAn individual may hold more than one position.

At one time in their careers, respondents had served as EM clerkship directors (14/71, 20%), residency program directors (8/71, 11%), education fellowship directors (9/71, 13%), vice chairs of education (6/71, 9%), and/or associate/assistant deans (2/71, 3%). None of the participants were department chairs. Interestingly, the career pathways of those with senior leadership positions (deans, vice chairs) most commonly included experience on a residency leadership team (6/8, 75%); none had previously served as clerkship director/assistant director (Table 3).

Many respondents reported professional service in EM education at the national level, in roles such as committee member (48/71, 68%), committee chair (18/71, 25%), and professional society board member (5/71, 7%). They were also active in providing education on a

TABLE 3 Respondent accomplishments

	n (%); Total n = 71
Local leadership positions	
Continuing medical education	
Vice chair of education	6 (8.5)
Other	12 (16.9)
Graduate medical education	
Residency program director	8 (11.3)
Assistant/associate residency program director	39 (54.9)
Medical education fellowship director	9 (12.7)
Assistant/associate medical education fellowship director	2 (2.8)
Other	8 (11.3)
Undergraduate medical education	
Clerkship director	14 (19.7)
Assistant/associate clerkship director	9 (12.7)
Assistant dean	1 (1.4)
Associate dean	1 (1.4)
Medical school course director	11 (15.5)
Other	6 (8.5)
National leadership positions in medical education	
Chair of a national committee	18 (25.4)
Board of directors of professional society	5 (7.0)
Other	8 (11.3)
Committee service in medical education	
National	48 (67.6)
Regional	12 (16.9)
Local	57 (80.3)
Awards in medical education (mean ± SD)	
National	1.27 ± 2.03
Regional	0.27 ± 1.07
Local	2.61 ± 3.76
Medical education presentations (mean ± SD)	
National	7.63 ± 10.83
Regional	1.89 ± 5.15
External grand rounds	1.38 ± 4.14
Non-medical education presentations (mean ± SD)	
National	8.59 ± 28.06

(Continues)

TABLE 3 (Continued)

	n (%); Total n = 71
Regional	2.08 ± 4.49
External grand rounds	1.49 ± 3.77
Journal editorial board member	10 (14.1)
Mean number of journals editor for	0.2 ± 0.53
Journal reviewer	34 (47.9)
Mean number of journals review for	1.80 ± 2.71
Medical education publications (mean ± SD)	
Research, peer reviewed	4.99 ± 6.17
Nonresearch, peer reviewed	0.96 ± 2.38
Non-peer-reviewed publications	0.39 ± 1.11
Digital scholarship	1.65 ± 4.31
Non-medical education publications	
Research, peer reviewed	3.11 ± 7.04
Nonresearch, peer reviewed	1.9 ± 4.91
Non-peer-reviewed publications	1.61 ± 3.97
Digital scholarship	9.59 ± 54.37
Textbooks	0.08 ± 0.41
Textbooks edited	0.31 ± 0.71
Book chapters	3.63 ± 5.81
Research presentations (mean ± SD)	
National	8.13 ± 16.31
Regional	1.66 ± 3.95
Local	1.41 ± 3.51
Research grant funding	
Medical education grant	31 (43.7)
Mean dollars	\$180,294.21 ± 375,372.51; n = 29
Federal	2 (2.8) (mean 1 ± 0; n = 2)
National (nonfederal)	17 (23.9) (mean 2.65 ± 1.87; n = 17)
Regional	5 (7.0) (mean 1.2 ± 0.45; n = 5)
Local	18 (25.4) (mean 1.89 ± 1.28; n = 18)
Non-medical education grant	10 (14.1)
Total funding (mean ± SD; n)	\$480,700.14 ± 814,552.49; n = 7
Federal	3 (4.2) (mean 1 ± 0; n = 3)
National (nonfederal)	3 (4.2) (mean 9.33 ± 12.74; n = 3)
Regional	2 (2.8) (mean 11.5 ± 14.85; n = 2)
Local	6 (8.5) (mean 2.67 ± 2.42; n = 6)

national level with a mean ± SD number of national presentations on medical education and non medical education topics of 7.63 ± 10.83 and 8.59 ± 28.06, respectively. Less than half of the respondents served as reviewers for scientific journals (34/71, 48%) and far fewer were members of editorial boards (10/71, 14%; Table 3).

Publications varied widely among respondents. The following results include any authorship (first author or otherwise). The mean ± SD number of peer-reviewed medical education research publications was 4.99 ± 6.17 and peer-reviewed non-education research publications was 3.11 ± 7.04. The mean ± SD number of peer-reviewed publications per year for all graduates was 1.89 ± 1.75. When analyzed by academic rank the mean ± SD number of peer-reviewed publications per year was 3.67 ± 3.06 for clinical instructors, 2.13 ± 1.74 for assistant professors, 2.24 ± 1.42 for associate professors, 0.85 ± 0.98 for professors, and 0.88 ± 1.31 for unknown or unranked graduates. Notably, respondents had far fewer digital publications on medical education topics (1.65 ± 4.31) than clinical or other topics (9.59 ± 54.37). Very few textbooks were published (0.08 ± 0.41) or edited (0.31 ± 0.71) by our participants; the mean ± SD number of textbook chapter contributions was 3.63 ± 5.81 (Table 3).

Some (31/71, 44%) of our respondents received grant funding for medical education research (including as principal investigator or co-investigator); 17 of 71 (24%) had received national/nonfederal grants and 18 of 71 (25%) received local/institutional grants. Few participants (2/71, 3%) had received a federal grant to support medical education research. Of those who received a medical education grant, 94% reported their funding amount; the mean ± SD total funding was \$180,294.21 ± \$375,372.51, skewed by a few large awards. The median total funding was \$30,000. Only 10 (14%) respondents had received grants for non-education research projects; 30% (3/10) of these were federal grants and 30% (3/10) were national, nonfederal grants. Seven participants reported the dollar amount received for non-medical education research and the mean ± SD total funding was \$480,700.14 ± \$814,552.49.

DISCUSSION

Our study builds on the limited outcome data of advanced medical education training programs by moving beyond satisfaction to describe what graduates have achieved in their professional performance after fellowship.¹³ The objective measures we identified and assessed can serve as starting place for future outcomes-based evaluations of medical education fellowships. We found that nearly all of our cohort of mostly early-career medical education fellowship graduates were working in academic settings. As one of the primary stated goals of medical education fellowships is to prepare graduates for a career in academic medicine, our outcomes indicate that fellowships achieve this objective.⁴ Further, the academic roles that graduates are taking are spread across the educational continuum from undergraduate medical education (UME), to graduate medical education (GME), and continuing medical education (CME). Fellowship graduates are in diverse leadership roles within their institutions as clerkship directors, residency program directors, education fellowship directors, vice chairs of education, and associate/assistant deans. Also, fellowship graduates demonstrate leadership beyond the institutional

level by serving on national committees. The ability of fellowship graduates to hold both institutional and national leadership positions within medical education suggest that fellowships position graduates for success as leaders within their field. This points to the successful development of a cadre of fellowship trained educational leaders, fulfilling the consensus goal of developing academicians who can thrive in leadership positions within academic departments and organizations.^{10,24} The career path of medical education fellowship graduates appears to demonstrate a successful proof of concept; in the future, there may be a reality that these fellowships become a prerequisite for those seeking leadership positions in education.

As most graduates pursue careers in academics, the ability to successfully perform research and produce scholarship is critical. While data on research productivity are difficult to place into context in the medical education world, most fellowship graduates in our cohort had medical education publications and many had received grants. While the average of five medical education and three non-medical education peer review publications is far from the median of 36 publications for full professors in EM, most of our cohort completed fellowship in the past 10 years, with a median of 5 years.²⁵ The mean number of publications per year for clinical instructors and assistant professors in our cohort is at the high end of the typical one to two publications per year expectation for junior academic faculty across medical specialties.²⁶⁻²⁹ The scholarly productivity of graduates in our study also exceeds previously published productivity levels of EM academic faculty (including career researchers) across all ranks except professor.³⁰ We suspect that we are unable to see the trend continue through the professor level due to the very small number of professors in our cohort. Finally, approximately 44% of graduates have received medical education grants for their research, which implies a further assigned value in their respective research missions. It is important to note that we took an inclusive approach to data collection and included both primary and supportive roles in an attempt to capture all relevant information. Future work may seek to examine these areas of scholarship and funding in more granular detail.

As these graduates mature they may take on roles that help address the lack of access to education research expertise and mentorship within academic emergency departments.³¹ This maturation may create a “snowball effect” that eventually fills the pipeline to support the career development and scholarly work of their more junior colleagues seeking to perform rigorous education research.^{31,32} The ability to create and mentor scholarly productivity is critical to the success of any individual academic career as well as the health of any subspecialty, including medical education. Early returns on research productivity reveals a promising yield from fellowship for graduates and an upward trajectory for the field of medical education.

Surprisingly, despite the growing number of fellowship programs over the past 10 years, we found surprisingly few graduates.⁵ This may be due to the young age of many of the fellowship programs, because most graduates who responded were at the clinical instructor or assistant professor level. Additionally, the relatively few graduates

can also be attributed to inconsistent filling rates of fellowship spots, which may be due to variable resources to support programming. However, given the relatively young age of EM as a field this number of graduates may not be substantially different than other fellowship programs. Despite the relatively small numbers, as most of the respondents are at the clinical instructor or assistant professor level, we can surmise that interest in fellowship programs is accelerating. This increase in recent fellowship graduates may imply a developing perception that medical education fellowships prepare graduates for academic success.

Participation and graduation from a medical education fellowship are associated with achievement of national and institutional leadership positions as well as research productivity. Because both of these elements are key factors in academic success, the return on investment for a medical education fellowship is reasonable for both prospective fellows and leaders seeking to develop future academics. Because of the positive yields and increasing popularity of fellowships, academic faculty positions may increasingly favor fellowship graduates moving forward. As noted, this cohort is early in their careers and as such this study should be repeated in the future to fully understand this potential trend, career trajectories, and other outcomes. However, given the small number of graduates that exist, fellowship training or a graduate degree as a strict prerequisite of residency or clerkship leadership positions seems unlikely.^{33,34} Ultimately, the medical education fellowship offers a structured pathway toward success in academic medicine. Further, the increasing participation in fellowships will contribute to the professionalization of medical education as a subspecialty within EM.

Future work should explore the personal and professional impact of faculty development programs on participants, learners, and institutions. Additionally, this work can explore the heterogenous qualities of each fellowship, e.g., 1- versus 2-year formats on fellowship outcomes. We had desired to explore differences between 1- and 2-year formats; however, our small sample size precluded our ability to detect meaningful differences. Qualitative methods might help build on this outcome evaluation by teasing out the parts of fellowships that are most valuable and elaborate on how medical education fellowships further professional identity formation.³⁵ The viewpoints of other stakeholders (chairs, vice chairs, and section chiefs) will also be important in determining the differences in junior faculty who have or have not completed fellowship programs. Finally, while we focused on academic impact, we did not assess financial impact as well as opportunity cost of pursuing a fellowship and, thus, cannot comment on the positive or negative financial ramifications of pursuing a medical education fellowship. Future studies should consider the economic impact of fellowship as well.

LIMITATIONS

This study has several limitations; any analysis of CVs is limited by the information reported. Also, while CVs provide the ability to objectively measure outcomes, CVs are not all-inclusive of the value of

a physician or their training. For example, CVs may not consistently capture mentoring activities, which would be an important outcome to assess in our study population. Further, we were also not able to cross-match fellowship graduates with colleagues who did not graduate from a fellowship. Because of the lack of a comparator group, we are unable to make conclusions that require comparison to a matched control, and while our response rate was good, our small sample size limits the precision and accuracy of our findings as well as the ability to evaluate differences in program formats. Future study of this cohort can address these limitations as they attempt to further define the impact of a medical education fellowship.

CONCLUSION

Emergency medicine medical education fellowship graduates show extensive academic involvement. Graduates hold leadership positions at the local and national level in medical education and are scholarly productive. These results can inform future development, refinement, and evaluation of medical education fellowships in EM.

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CONFLICTS OF INTEREST

The authors have no potential conflicts to disclose.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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