



Graduates of a Multidisciplinary Critical Care Training Program from 2000 to 2020: Looking at Their First Job

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ABSTRACT

Background: Little is known regarding the career paths of adult multidisciplinary critical care medicine (CCM) fellowship graduates.

Objective: The purpose of this study is to describe the demographic profiles and characteristics of the first jobs held by internal medicine–CCM fellowship graduates trained at a freestanding cancer center.

Methods: An electronic survey was developed via Research Electronic Data Capture that addressed first employment parameters and was sent between May 1, 2019, and December 31, 2021, to 133 CCM fellows who completed CCM fellowship training from 2000 to 2020 at our institution.

Results: A total of 93 fellows (70%) responded to the postfellowship job survey; 80 (60%) with complete responses were analyzed. Seventy-four percent of respondents were men, 41% were White, 81% were international medical graduates, and 31% were holders of J-1 exchange visitor ($n = 8$) or H-1B ($n = 17$) visas. The mean age at completion of CCM fellowship was 36 years. Twenty-seven respondents (34%) completed two years of fellowship training and 53 (66%) completed one year. Internal medicine was the primary residency training before CCM fellowship for 75 respondents (94%) and emergency medicine for 5 (6%). Of those who did one year of fellowship ($n = 53$), 45 (85%) had already completed two-year fellowships in pulmonary medicine. Thirty-two respondents (40%) completed training from 2000 to 2009 and 48 (60%) from 2010 to 2020. The first

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employment for the majority (>80%) of graduates was in community teaching hospitals. Of the graduates who spent $\geq 50\%$ of time clinically in CCM, 85% rounded in multiple intensive care units (ICU). Compensation sources were from hospitals for 81%, private billing for 15%, and through faculty practice plans for 4% of respondents. At the time of survey completion, 51 respondents (64%) were still at their first jobs; of these, slightly more than half (56%) had graduated from the fellowship program in the past 10 years.

Conclusion: The majority of CCM fellowship graduates from our program practiced CCM at community teaching hospitals, rounded in multiple ICUs, and were compensated primarily by the hospital.

Keywords:

critical care medicine; fellowship; training; career; employment

Internal medicine (IM)-based critical care medicine (CCM) fellowships are either integral components of Accreditation Council for Graduate Medical Education (ACGME)-accredited pulmonary CCM programs or stand-alone fellowships (1). Stand-alone IM CCM programs offer one- or two-year tracks (2). The one-year CCM track accommodates graduates of two-year accredited fellowship training in IM subspecialties (e.g., pulmonary, infectious disease, nephrology) or graduates of three-year IM fellowships in either cardiovascular disease or gastroenterology. The two-year CCM track includes graduates of three-year accredited IM residency training programs or three- or four-year emergency medicine programs. In 2020, there were 49 ACGME-accredited IM critical care stand-alone fellowship programs with a total of 260 active fellows (3). A shortage of intensivists is believed to be present in the United States, although the

magnitude of this shortage is difficult to ascertain (4–8). Moreover, although there are approximately 28,800 privileged intensivists in the United States, they are working in only 52% of acute care hospitals (8). It has been the hope of the critical care community (6) that graduates of stand-alone CCM two-year fellowship programs would pursue full-time careers in critical care upon their graduation. In contrast, graduates of one-year CCM fellowship programs, already trained in other subspecialties, will probably pursue dual-career pathways.

To our knowledge, there have been no studies assessing the types of jobs that graduates of stand-alone adult IM-CCM fellowship programs take upon graduation and the percentage of their practice directly related to patient care in the intensive care unit (ICU). The purpose of this study was to determine the

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demographic variables of our graduated CCM fellows over 20 years and the core parameters of their first postgraduate jobs.

METHODS

We conducted an electronic survey of fellows who completed multidisciplinary CCM fellowship training at Memorial Sloan Kettering Cancer Center (MSKCC) in New York from 2000 to 2020. The fellowship program increased its complement of fellows from 6 in 2000 to 8 in 2008, 10 in 2011, and 12 in 2018.

The survey was piloted with four trainee graduates of varying postgraduate time periods and iteratively refined by the authors. The link to the survey was sent via e-mail to the fellows with an invitation letter from the program director (S.M.P.). The survey was administered electronically through Research Electronic Data Capture, hosted at MSKCC and open from May 1, 2019, to December 31, 2021. Four e-mail invitations (one initial and three follow-up e-mails) with a link to the survey were sent to 133 fellow graduates.

The survey consisted of two components. The first included 20 questions on the characteristics of the fellows' first jobs after training: geographic location, primary work practice type, CCM practice type (clinical, education, administrative, and research) and percentages of clinical and nonclinical time in the job, hospital and academic appointments and titles on job entry, compensation source and type, hospital and CCM committee appointments, and whether the fellows were still in the same first jobs after fellowship.

The second survey component consisted of five general questions regarding the fellows' development of critical care expertise after fellowship (e.g.,

extracorporeal membrane oxygenation [ECMO], neurocritical care, point-of-care ultrasound [POCUS]), involvement in ICU design or renovation, participation as consultants to industry or pharmaceutical companies, participation in medicolegal consulting, and national or international CCM society membership.

In addition, we obtained survey respondents' demographic data (race, ethnicity, and visa status [U.S. citizen, permanent resident, J-1 exchange visitor visa, or H-1B visa]) and their education (U.S. or international medical school), training and professional certification information from our fellowship application files and the American Medical Association Physician Masterfile.

Data were analyzed for respondents who completed both parts of the survey, including respondents who may have skipped 1 or 2 of the 20 questions in the job description component of the survey. We used descriptive statistics with Student's *t* tests, Pearson's chi-square tests, and Fisher's exact tests, as appropriate (SPSS Version 26; IBM). Categorical values are reported as frequencies and percentages. This study was approved (August 29, 2018) with a waiver of the requirement to obtain informed consent and amended with approval (November 2, 2021) by the institutional review board of MSKCC (number 18-025). All study procedures were followed in accordance with established ethical standards for human subjects research.

RESULTS

Of the 133 CCM fellowship graduates (from 40 two-year and 93 one-year fellowships) contacted, 93 (70%) responded, but only 80 (60%) completed both survey components and were analyzed. Slightly more than 50% of respondents had completed their CCM fellowship training

Table 1. Demographics of respondents (*n* = 80)

| Variable | All [<i>n</i> (%)] | 1-yr Fellowship [<i>n</i> (%)] (<i>n</i> = 53) | 2-yr Fellowship [<i>n</i> (%)] (<i>n</i> = 27) |
|--|---------------------|---|---|
| Gender | | | |
| Male | 59 (74) | 43 (81) | 16 (59) |
| Female | 21 (26) | 10 (19) | 11 (41) |
| Race | | | |
| White | 33 (41) | 16 (30) | 17 (63) |
| Asian | 28 (35) | 21 (40) | 7 (26) |
| Black | 11 (14) | 10 (19) | 1 (4) |
| Other | 8 (10) | 6 (11) | 2 (7) |
| Ethnicity | | | |
| Non-Hispanic | 74 (93) | 50 (94) | 24 (89) |
| Hispanic | 6 (7) | 3 (6) | 3 (11) |
| Medical school of graduation | | | |
| U.S. medical graduate | 15 (19) | 8 (15) | 7 (26) |
| M.D. | (73) | (75) | (71) |
| D.O. | (27) | (25) | (29) |
| IMG | 65 (81) | 45 (85) | 20 (74) |
| Visa status during CCM fellowship | | | |
| U.S. citizen | 34 (43) | 21 (40) | 13 (48) |
| U.S. permanent resident | 21 (26) | 13 (25) | 8 (30) |
| H-1B*/EAD | 17 (21) | 14 (26) | 3 (11) |
| J-1 [†] | 8 (10) | 5 (9) | 3 (11) |
| Type of primary residency training before CCM fellowship | | | |
| Internal medicine | 75 (94) | 53 (100) | 22 (81) |
| Emergency medicine | 5 (6) | 0 (0) | 5 (19) |
| Type of fellowship training before CCM fellowship (<i>n</i> = 53) | | | |
| Pulmonary | 45 (88) | | |
| Nephrology | 6 (12) | | |
| Infectious disease | 2 (4) | | |
| Year of graduation | | | |
| 2000–2004 | 13 (18) | 11 (21) | 2 (7) |

Table 1. Continued.

| Variable | All [n (%)] | 1-yr Fellowship [n (%)] (n = 53) | 2-yr Fellowship [n (%)] (n = 27) |
|-----------|-------------|----------------------------------|----------------------------------|
| 2005–2009 | 19 (26) | 13 (25) | 6 (22) |
| 2010–2014 | 21 (28) | 12 (23) | 9 (33) |
| 2015–2020 | 27 (28) | 17 (32) | 10 (37) |

Definition of abbreviations: CCM = critical care medicine; EAD = employment authorization document; IMG = international medical graduate.

*H-1B visas for physicians are non-immigrant visas that allow for the temporary employment of international medical graduates in the United States to engage in direct patient care or as part of a medical training program or to teach or conduct research for a sponsoring employer.

[†]J-1 is a non-immigrant exchange visitor visa often used by international medical graduates pursuing a medical residency or fellowship training in the United States.

within the past 10 years. Table 1 shows the demographic data of respondents (from one-year and two-year fellowships); 74% were men, 33 (41%) were White, 74 (93%) were non-Hispanic, 65 (81%) were international medical graduates (IMGs). Of the IMGs, 25 (31%) were on J-1 (non-immigrant-intent exchange visitor) ($n = 8$) or H-1B (immigrant-intent) ($n = 17$) visas. The remaining 40 IMGs were U.S. citizens ($n = 34$ [43%]) or U.S. permanent residents ($n = 21$ [26%]). IM was the primary residency training before CCM fellowship for 75 respondents (94%) and emergency medicine for 5 (6%). Twenty-seven of the respondents (34%) completed two years of CCM fellowship training, and 53 (66%) completed one year. All 27 two-year-trained fellows were first employed in hospital-based jobs. Of the 53 one-year-trained fellows, the majority ($n = 39$ [74%]), including 31 of 45 fellows who had completed two-year pulmonary fellowships, all 6 who had completed nephrology fellowships, and 2 who completed infectious disease fellowships, were first employed in hospital-based jobs. In contrast, 14 of those with pulmonary subspecialty training were first employed in group practices. Overall, 72 (98%) fellow graduates were board certified in

CCM. Fifty-one (64%) were still at their first jobs at the time of their survey responses; of these, slightly more than half (56%) had graduated from the fellowship program in the past 10 years.

Practice Location, Setting, and Hospital Type ($n = 80$)

Seventy-eight graduates (98%) were first employed in the United States (predominantly in the Northeast, Southeast, and Midwest); 83% were hospital based and 17% in group (private) practice (see the data supplement). There was a statistically significantly higher number of two-year fellowship graduates who had completed primary residency in IM or emergency medicine who were hospital based compared with one-year graduates who had completed other subspecialty fellowship training after primary residency in IM (100% vs. 74%; $P = 0.014$). Sixty-six (83%) were first employed at community teaching or university-affiliated hospitals, 12 (15%) in community nonteaching hospitals, and 2 (3%) in primary university medical centers.

Practice Type and Clinical Time Devoted to Critical Care ($n = 75$)

Of the 75 fellows who responded to this survey item, all (100%) indicated that their

Table 2. General survey questions ($n = 80$)

| Variable | <i>n</i> (%) |
|---|--------------|
| Development of critical care expertise | |
| ECMO | 14 (18) |
| Neurocritical care | 6 (8) |
| Point-of-care ultrasound | 4 (5) |
| Cardiothoracic critical care | 3 (4) |
| Involvement in ICU design or renovation | 12 (15) |
| Participation as consultant to industry or pharmaceutical company | 4 (5) |
| Participation in medicolegal consulting | 3 (4) |
| Society membership | |
| CHEST | 60 (75) |
| SCCM | 55 (69) |
| ATS | 31 (39) |
| Neurocritical Care Society | 7 (9) |
| Others* | 14 (18) |

Definition of abbreviations: ATS = American Thoracic Society; CHEST = American College of Chest Physicians; ECMO = extracorporeal membrane oxygenation; ICU = intensive care unit; SCCM = Society of Critical Care Medicine.

*Other societies included the American Association for Bronchology and Interventional Pulmonology, American Association of Sleep Medicine, American College of Emergency Physicians, American College of Physicians, American Society of Nephrology, Infectious Disease Society of America, European Respiratory Society, European Society of Intensive Care Medicine, and Extracorporeal Life Support Organization.

clinical practice in their first jobs involved critical care; 68% were also involved in education, 57% in administration, and 23% in research.

Eighty percent of the fellows spent $\geq 50\%$ of clinical time devoted to critical care.

There was a statistically higher percentage of time devoted to critical care among two-year fellows compared with one-year fellows (83% vs. 62%; $P = 0.001$).

ICU Assignments, Hospital Committees, and Job Titles in CCM at Job Entry

Eighty-five percent of the fellow graduates rounded in multiple ICUs. ICU management, infection control, and

graduate medical education were the most common hospital committee appointments. Fifty-four respondents (68%) had no administrative titles in CCM on job entry; 26 (32%) held administrative roles, including 14 who were ICU directors.

Compensation Sources and Type

Compensation sources were from hospitals for 81%, private billing for 15%, and faculty practice plans for 4% of respondents (*see* the data supplement).

General Survey Questions

Eighteen percent of respondents developed critical care expertise in

ECMO, 8% in neurocritical care, and 5% in POCUS in their first jobs (Table 2). Fifteen percent were involved in ICU design or renovation. The majority were members of either the American College of Chest Physicians (75%) or the Society of Critical Care Medicine (69%).

DISCUSSION

This survey represents the first study to determine the characteristics of the first jobs held by graduates of a stand-alone adult multidisciplinary CCM fellowship program. The results show that the majority (>80%) of our graduates were first employed in community or university-affiliated teaching hospitals. As teaching hospitals are also more likely to have multiple ICUs, we found that most of our fellow graduates worked in multiple ICUs in their first jobs (9). This matches the training approach and ACGME requirements of stand-alone CCM fellowships, in which one- and two-year trainees in IM, IM subspecialties, or emergency medicine are required to have clinical experience in various types of ICUs, including medical, surgical, trauma, neurocritical care, and cardiac intensive care. On the basis of our findings, this training mandate allows CCM fellows to secure jobs in hospitals that have multiple and mixed types of ICUs and feel comfortable in this type of practice environment.

It was not surprising that two-year fellowship graduates after primary residency in IM or emergency medicine spent a greater percentage of clinical time in CCM compared with one-year graduates. Two-year graduates are focused primarily on CCM, whereas one-year fellows with pre-CCM fellowship training in non-CCM disciplines (i.e., pulmonary medicine, infectious disease, and nephrology) appear to have

more diverse clinical employment interests than two-year CCM-only fellows.

Predictably, only a minority (one-third) of respondents held administrative roles in their first jobs. Commonly, it takes time to obtain such appointments in most hospital settings. However, even at one-third, this finding highlights the importance of formal training in administrative and management skills during CCM fellowship training, as currently required by the ACGME.

Our survey revealed that compensation type was commonly a fixed salary and in addition involved bonuses based on productivity (relative value units), administrative activities, shift differential, or a combination thereof. This matches traditional compensation models for physicians that involve primarily a salary or a net- or gross-revenue basis, with some type of bonus or incentive component (10). We did not request information on actual financial compensation or benefits, because regional market factors usually determine the financial totals that are included in most compensation packages offered to fellowship graduates, and such data are already available from the Medical Group Management Association, the American Medical Group Association, Medscape, and other publicly available benchmarking sources (11, 12).

Strengths and Limitations

Our study has a few limitations, including its single-center and retrospective design. Although our survey response rate of only 60% may have affected the data, this rate is higher or comparable to the 47% and 59% response rates from recent surveys of the first jobs of graduates of surgical oncology and regional anesthesiology and acute pain medicine fellowships, respectively (13, 14). In terms of the generalizability of our fellows to those in other

IM–CCM programs nationwide, we found that the demographics of our respondents (74% men, 41% White, and 93% non-Hispanic) were very comparable to those of the broader group. However, we note that a higher percentage of our fellow respondents were IMGs than among the national group (81% vs. 46.2–69.2%, respectively) (*see* the data supplement). In addition, we did not inquire about the personal factors that influenced fellows' choices of their first jobs (e.g., desire to work in a defined geographic region, importance of proximity to family). Certainly, the choice of where to work for IMGs with J-1 and H-1B visas (31% of our respondents) was guided by federal regulations, which are a major factor that leads them to specific hospital types for their first jobs. Finally, we were not able to ascertain whether research during fellowship or medical school pedigree influenced the choice of the first job after fellowship.

Conclusions

Our study provides new knowledge on the core parameters of the first jobs of fellows who graduate from stand-alone CCM fellowship programs. Larger, more diverse multicenter studies are needed to confirm these findings.

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