Published in final edited form as:

Crit Care Med. 2014 May ; 42(5): 1272–1279. doi:10.1097/CCM.0000000000000250.

Training Internists to Meet Critical Care Needs in the United States: A Consensus Statement from the Critical Care Societies Collaborative (CCSC)

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The remaining authors have disclosed that they do not have any potential conflicts of interest.

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Abstract

Objectives—Multiple training pathways are recognized by the Accreditation Council for Graduate Medical Education (ACGME) for internal medicine (IM) physicians to certify in critical care medicine (CCM) via the American Board of Internal Medicine. While each involves 1 year of clinical fellowship training in CCM, substantive differences in training requirements exist among the various pathways. The Critical Care Societies Collaborative convened a task force to review these CCM pathways and to provide recommendations for unified and coordinated training requirements for IM-based physicians.

Participants—A group of CCM professionals certified in pulmonary-CCM and/or IM-CCM from ACGME-accredited training programs who have expertise in education, administration, research, and clinical practice.

Data Sources and Synthesis—Relevant published literature was accessed through a MEDLINE search and references provided by all task force members. Material published by the ACGME, American Board of Internal Medicine, and other specialty organizations was also reviewed. Collaboratively and iteratively, the task force reached consensus using a roundtable meeting, electronic mail, and conference calls.

Main Results—Internal medicine-CCM-based fellowships have disparate program requirements compared to other internal medicine subspecialties and adult CCM fellowships. Differences

between IM-CCM and pulmonary-CCM programs include the ratio of key clinical faculty to fellows and a requirement to perform 50 therapeutic bronchoscopies. Competency-based training was considered uniformly desirable for all CCM training pathways.

Conclusions—The task force concluded that requesting competency-based training and minimizing variations in the requirements for IM-based CCM fellowship programs will facilitate effective CCM training for both programs and trainees.

Keywords

training; critical care medicine; internal medicine; fellowship education; requirements; workforce

INTRODUCTION

Internal medicine (IM) is the parent specialty for the majority of physicians who identify themselves as intensivists. The Accreditation Council for Graduate Medical Education (ACGME) recognizes multiple training pathways (Table 1) that allow internists to certify in critical care medicine (CCM) via the American Board of Internal Medicine (ABIM) (1, 2). For the purposes of this paper, the 2-year CCM training program will be referred to as *IM-CCM*, and combined pulmonary and critical care program will be referred to as *PCCM*. Although structured differently, these training pathways share identical goals: for critical care fellows to acquire competency in the subspecialty and amass sufficient expertise to practice either as primary or consulting intensivists. Each pathway involves 1 year of fellowship training in CCM (1), but substantial differences exist in the requirements for CCM training programs (Table 2). These variations may be justified to address differences in trainee backgrounds; however, unnecessary variations in education may create barriers for optimal CCM training. We present a set of recommendations, based on specified principles, for the ACGME to consider to harmonize the educational requirements for CCM and reduce the existing variation in training program requirements.

TASK FORCE DEVELOPMENT AND CHARGE

In fall 2012, the Critical Care Societies Collaborative (CCSC) convened a task force to delineate and provide consensus recommendations regarding the development of unified and coordinated internist training pathways that address current and future critical care requirements in the United States. Representatives from the American College of Chest Physicians (ACCP), American Thoracic Society (ATS), and the Society of Critical Care Medicine (SCCM) were charged with developing a consensus statement with a set of recommendations for standardizing the educational process for IM-trained physicians to become intensivists. The American Association of Critical-Care Nurses, a member of the Critical Care Societies Collaborative, declined to participate but was supportive of the work of the task force.

METHODS

The chairpersons of the task force worked with the leadership of CCSC and the Collaborative stakeholders to identify participants from ACGME-accredited CCM training

programs who had broad expertise in clinical medicine, education, research, and administration. These individuals were either currently or previously involved with training fellows in IM-based CCM programs and represented both IM-CCM and PCCM tracks. They were asked to address the following specific issues: the state of CCM physician workforce; current educational process and training requirements for certification in CCM based in IM; challenges in the development of congruous CCM training pathways for internists; and development of training recommendations that may inform accrediting organizations.

The following principles guided the recommendations of the task force:

1. Because of the limited evidence base from which to derive training requirements for IM-based critical care, recommendations are based on principles, international standards, and the experience and consensus of the task force members.
2. Critical care training of internists should be based on acquiring specific critical care competencies in accordance with other ACGME training requirements.
3. Physician workforce projections are important in estimating the appropriate number of CCM training positions, but they should not be used to determine the content or duration of the training needed to create a competent critical care clinician.
4. An explicit rationale should exist for differences in requirements among IM-based critical care training programs.

The task force reviewed relevant literature accessed through a MEDLINE search and references provided by all task force members. Material published by the ACGME, ABIM, and other specialty organizations was also reviewed. The task force worked via conference calls, e-mail exchanges, and a meeting held on January 20, 2013, in conjunction with the SCCM Congress. The final draft of this paper was presented to leadership of ACCP, ATS and SCCM for review, feedback, and official approval from each organization.

Internal Medicine, Critical Care Medicine Training, and the Projected Intensivist Workforce Shortage

In the last 3 decades, the use of critical care services in the United States has grown rapidly, outpacing many other elements of healthcare (3, 4). Most evidence supports involvement of trained intensivists in the care of the critically ill (5–9). Population demographics, particularly the aging U.S. population, the Leapfrog Group intensive care unit (ICU) staffing recommendations (10), and ACGME resident duty-hour limitations (11, 12) have increased the workload of intensivists and non-intensivist critical care providers (i.e., hospitalists, family practitioners, nurse practitioners, physician assistants) (13). These trends have led to predictions that the current shortage of intensivists will only grow for the foreseeable future (14–17).

This disparity in ICU staffing supply and demand may be making careers in CCM less desirable for new trainees and unsustainable for practicing clinicians. Increased patient care demands may increase burnout (18) and cause intensivists to leave the field, increasing the burden on those remaining. A recent survey of pulmonary/critical care fellowship directors showed that most feel that their ICUs are too large and that patient care, training, and

workforce stability are adversely affected (19). Concern for staffing prompted SCCM to develop guidelines to help institutions optimize patient care and appropriately utilize intensivists (20). Although information technology systems, advanced practice providers, and other interventions may improve ICU efficiency, these efforts are unlikely to reverse the basic trend of too many critically ill patients with too few intensivists to care for them.

Because of the multiple routes to board certification, CCM training requirements must be periodically reevaluated to ensure that standardized competency-based goals are met. Program requirements ensure the quality of training and trainees who come from varied backgrounds. However, when differences in requirements cannot be justified on this basis, they must be assessed to avoid inadvertent barriers to program expansion, creation, and trainee recruitment.

Educational process and program requirements for internists seeking CCM certification

Critical care fellows commonly follow one of two ACGME-approved training pathways after completing an IM residency: 1 year of fellowship training in CCM after 2 years of accredited fellowship training in an IM subspecialty (e.g., pulmonary, infectious disease, and nephrology) or 3 years for cardiovascular disease and gastroenterology (pathway A, Table 1); or 2 years of fellowship training in CCM (pathway B, Table 1) (1, 2). The ABIM describes an additional pathway for admission to board certification after 2 years of fellowship training in advanced general IM that includes at least 6 months of CCM during IM residency, followed by 1 year of fellowship training in CCM (pathway C, Table 1) (2); however, currently there is no ACGME-accredited fellowship training in advanced general internal medicine. The ABIM certifies CCM fellowship-trained internists. Emergency medicine board-eligible physicians can train in IM-CCM fellowship programs, complete the ABIM-CCM examination, and obtain certification in CCM from the American Board of Emergency Medicine. The requirement that 75% of IM-CCM fellows (averaged over a 5-year period) must be graduates of ACGME-accredited IM programs effectively limits emergency medicine trainees to 25% in any IM-CCM fellowship program.

Three-year PCCM programs comprise the largest number of U.S. training programs leading to board eligibility in CCM, followed by programs in surgery, anesthesiology, neurocritical care, and IM-CCM (21). The 138 PCCM fellowship programs, with a total of 1,509 positions, graduate approximately 500 fellows yearly; in contrast, the 34 IM-CCM programs have 201 positions and graduate approximately 100 fellows yearly (21).

Current CCM Program Requirements

Critical care supports patients with life-threatening injuries and illnesses that cover a spectrum of medical, cardiac, neurological, and surgical problems. Critical care training, therefore, must provide fellows with clinical experiences in the evaluation and management of different types of critically ill patients.

The amount of total clinical and critical care experience required for internists pursuing CCM fellowships may differ somewhat depending on the training background of the individual (Table 2). For both IM-CCM and PCCM trainees, at least 9 months of ICU experience is required: at least 6 months in medical (MICU) or cardiac (CICU) intensive

care unit, and 3 months in non-medical (e.g., trauma, surgical, neurological, transplant) settings (1). For those who enter CCM programs from another IM fellowship (cardiology, infectious disease, or nephrology), up to 3 months of MICU or critical care unit experience obtained during the subspecialty fellowship may count toward the 6 months of the CCM fellowship training (2). The remaining time, as well as the second year of CCM training, may be spent on additional clinical experience, research, quality improvement or other scholarly activity, and completion of the required clinical or academic experience in the companion specialties.

In cases of dual certification, the minimum total full-time clinical training is 18 months for the combination of certification in CCM/pulmonary disease, 20 months for CCM/nephrology, 22 months for CCM/infectious disease, and 30 months for CCM/cardiovascular disease. The total training time is not reduced and remains 4 years for certification in CCM and cardiovascular disease or gastroenterology, and 3 years for certification in CCM and any other IM subspecialty (2).

Differences in Training Requirements for IM-CCM Programs and Other Specialties

Comparing IM-based CCM pathways to each other and to the anesthesiology and surgery fellowships in CCM highlights important differences (Table 2). IM-CCM-based fellowships have unique program requirements that are not linked to differences in pre-fellowship preparation or curriculum (Table 3). These include a requirement for additional ACGME-accredited IM subspecialty fellowships to be offered at the primary site, for fellows to perform a specified minimum number of bronchoscopies, the exclusion of non-ABIM-certified intensivists as key clinical faculty (KCF), and higher ratios of KCF to fellows (1).

Surgery- and anesthesia-based CCM fellowship training programs require a core residency program, but not fellowships, on-site. IM-CCM and PCCM require at least 3 and 2 other IM subspecialty fellowship programs, respectively, at the primary training site (Table 2). This requirement may preclude otherwise qualified institutions from developing CCM fellowship programs, particularly if they are not affiliated with a medical school or have insufficient resources to support 2 or 3 additional subspecialty fellowship programs. A recent survey of designated institutional officers and IM residency program directors revealed that this multiple fellowship requirement was the greatest barrier to initiating CCM fellowships (22). While the practice of CCM is multidisciplinary, the task force did not identify any empirical evidence suggesting that multiple on-site fellowships, as opposed to access to clinical expertise in these fields, are a necessary component for an effective CCM fellowship program. Two prior SCCM task forces on CCM training did not determine that multiple fellowships were needed to start and maintain a CCM fellowship program (23, 24).

IM-based CCM pathways also require a minimum number of bronchoscopies, and bronchoscopy is the only procedure for which a predetermined number is specified (1). A review of the literature revealed one study (25) supporting the ACGME standard that trainees perform a minimum of 100 bronchoscopies during pulmonary fellowship training. This was a prospective multicenter study comparing usual bronchoscopy education of new pulmonary fellows to a structured educational approach that included simulation training. Using a validated Bronchoscopy Skills and Tasks Assessment Tool (BSTAT), the authors

found significant variation in bronchoscopy skills at the pulmonary fellows' 50th procedure; the speed of acquiring the necessary skills was enhanced by incorporating simulation bronchoscopy into the educational curriculum. The task force believes that the high median and wide variance of BSTAT scores after 50 bronchoscopies underscores the variation in time and procedural volume necessary to achieve competence, and that a minimum number of procedures is not appropriate. Additionally, although "therapeutic" bronchoscopy (as it is described in the program requirements) is an important technique for intensivists, there is no evidence that it is more essential to practice or more difficult to learn than endotracheal intubation or tube thoracostomy, two core procedures for which competency procedure volume is not specified. Given the ACGME position that assessment of procedural competence should include a formal evaluation process (including use of simulators) and not be based solely on an arbitrary minimum number of procedures performed (3), the task force agrees that additional research is needed to determine the proper training requirements for (therapeutic) bronchoscopies for IM-CCM trainees (26–28). A recent systematic review of 17 studies concluded that simulation-based bronchoscopy training was associated with significant benefits on learner skills (eg, airway inspection) and behaviors (time and process) when compared to no intervention or alternate instruction (28). However, this review was limited by the quantity and quality of the original studies, and the various simulation modalities, outcome measures, and type of trainees that were analyzed.

Many IM-based CCM programs have surgery or anesthesia critical care-certified faculty who are integral to their educational programs or who teach in medical (or mixed medical/surgical) ICU settings (22). However, only ABIM-certified faculty can serve as KCF for IM-CCM and PCCM pathways or supervise these fellows in such ICUs. Thus, if a PCCM or IM-CCM fellow rotates in a MICU or mixed medical-surgical ICU when a non-IM-trained intensivist is the teaching attending, those weeks or months cannot be counted toward the fellow's training in medical critical care. This ACGME requirement complicates the KCF and ICU staffing requirements for the fellowships and is inconsistent with the multidisciplinary nature of CCM.

Finally, a higher ratio of KCF to fellows is required in IM-CCM programs compared to other IM-based fellowships, including PCCM fellowships (Table 2). PCCM programs require one KCF for every 1.5 fellows if there are more than 9 fellows in the program, whereas IM-CCM programs must have 1 KCF for every fellow if more than 3 fellows are in the program. This stipulation may limit current programs from increasing their fellowship complements. Furthermore, the task force was unable to find information to support this requirement.

Competency-Based Training for Internists

The ACGME and ABIM require documentation that candidates for certification are competent in: 1) patient care and procedural skills, 2) medical knowledge, 3) practice-based learning and improvement, 4) interpersonal and communication skills, 5) professionalism, and 6) systems-based practice (1, 2). The task force strongly supports competency-based medical education in CCM and also believes that graduates of all IM-based CCM programs should bring uniform skill sets to the bedside once they have completed training. Fellowship

program directors and their faculty must provide education and training aimed at producing competent, professional intensivists who meet the expectations of patients and their families, hospitals, professional societies, and accrediting bodies. To meet these aims, faculty members evaluate fellows within the 6 core areas of competence and provide supervision as the fellows assume gradually increasing responsibilities for the care of critically ill patients. Assessment of medical knowledge has long been a function of the ABIM certification examination, but determining competency in other areas can lack precision. One successful strategy has been to determine the behaviors that are exhibited by competent and expert individuals in each of the competencies and then to gauge the degree to which trainees exhibit those behaviors. We anticipate that the educational milestones in the ACGME's Next Accreditation System (29) will further improve the assessment and documentation of competence for all IM-based CCM trainees.

Recommendations

The multisociety task force makes the following recommendations, based on our analyses:

1. ACGME training requirements for all IM-based CCM fellowship programs should be harmonized.
2. The requirement for IM-CCM and PCCM programs to offer at least 3 of the 5 ACGME-approved IM subspecialty fellowship programs (cardiovascular disease, gastroenterology, infectious diseases, nephrology, and pulmonary disease) at the primary clinical CCM training site is not supported by evidence and should be eliminated until demonstrated to be a necessary component of CCM training.
3. Board-certified intensivists with specialty training in anesthesiology and surgery should be eligible to serve as KCF for CCM fellowship programs based in IM, and to supervise the training of these fellows in MICU settings. We suggest that the ACGME create a proportional limit of non-IM-trained KCF and allowable MICU teaching time.
4. The KCF-to-fellow ratio for all IM-based CCM fellowships should be standardized at 1:1.5.
5. The requirement for IM-CCM trainees to perform 50 therapeutic bronchoscopies is not supported by evidence either of competency assessment or clinical training need; this criterion should be eliminated, with bronchoscopic training needs and procedural competency determined by other means.
6. We recommend modification of the requirement that 75% of IM-CCM and PCCM fellows (averaged over 5 years) be graduates of ACGME-accredited IM programs, and we propose a limit of 50% to allow IM-CCM training programs to select the best fellowship candidates from non-IM ACGME-approved programs (e.g., emergency medicine).

Conclusions

Although each training pathway requires 1 year of CCM fellowship clinical training, criteria vary between IM-CCM and PCCM programs, including the higher ratio of KCF to fellows

and a requirement to perform 50 therapeutic bronchoscopy procedures. We concluded that removing the variations in the training requirements for IM-based CCM programs and focusing on competency-based training will be effective for both programs and trainees. Finally, our recommendations preserve the notion that IM-based critical care training programs should retain a strong emphasis on IM while embracing the importance of multidisciplinary training.

Acknowledgments

The task force thanks Ms. Sharon Plenner from SCCM for administrative support.

Copyright Form Disclosures: Dr. Pastores' institution received grant support from Spectral Diagnostics (Dr. Pastores is principal investigator at MSKCC for a septic shock clinical trial) and Bayer Healthcare (Dr. Pastores is principal investigator at MSKCC for a gram-negative pneumonia clinical trial). Dr. Martin served as board member for Cumberland Pharmaceuticals and Pulsion Medical Systems and received support for article research from NIH. His institution received grant support from NIH, FDA, Baxter Healthcare, and Abbott Laboratories. Dr. Baumann served as board member for ACCP Board of Regents, is employed by the University of Mississippi Medical Center, received support for the development of educational presentations (various post graduate courses and other products for ACCP and/or ATS), and received support for travel (paid as part of ACCP Board of Regents). Dr. Curtis' institution received grant support from NIH and PCORI. Dr. Fessler received support for development of educational presentations from Oakstone Medical Publishers (Payment for editorial services for a monthly journal review digest in CCM) and received support for travel from American Thoracic Society (Travel expenses to attend committee meetings) and the Association of Pulmonary and Critical Care Medicine Program Directors (Travel expenses to attend committee meetings or to represent the Association at professional society meetings). Dr. O'Grady served as a board member for ABIM and is a government employee. Dr. Ognibene is an employee of the U.S. government and has no copyright authority. Dr. Simpson received support for travel from the Surviving Sepsis Campaign (Planning committee for national sepsis collaborative) and other: IMPRESS Study (North American Co-Chair for the International Multicenter Prevalence Study on Sepsis; no honorarium). His institution received grant support from Kansas City Area Life Sciences Foundation (Grant for sepsis quality improvement work in Kansas City).

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Table 1**Pathways for Admission of Medical Intensivists to Critical Care Certification²*****Pathway A^a***

- 2 years of accredited fellowship training in a subspecialty of internal medicine (3 years for cardiovascular disease and gastroenterology), including the care of patients in critical care units^b
- Certification by American Board of Internal Medicine in the subspecialty
- 1 year of accredited clinical fellowship training in critical care medicine within department of medicine

Pathway B

- 2 years of accredited fellowship training in critical care medicine (including 12 months of full-time clinical training) within department of medicine

Pathway C^c

- 2 years of fellowship training in advanced general internal medicine that includes at least 6 months of critical care medicine
- 1 year of accredited fellowship training in critical care medicine within department of medicine

^aDiplomates of American Board of Internal Medicine who are also certified in neurology by the American Board of Psychiatry and Neurology may apply through pathway A provided neurology training included the care of patients in critical care units and the additional year of accredited critical care medicine fellowship training is sponsored by a department of internal medicine.

^bCandidates seeking dual certification in pulmonary disease and critical care medicine must complete a minimum of 3 years of accredited combined training, at least 18 months of which must be clinical training. Certification in pulmonary disease must be achieved before the candidate is eligible to apply for admission to the critical care medicine examination.

^cCurrently, no fellowship in advanced general internal medicine is available through Accreditation Council for Graduate Medical Education.

Table 2

Key Differences in the Specialty-Specific Training Requirements in Critical Care Medicine in the United States

IM-CCM	PULMONARY-CCM	ANESTHESIOLOGY-CCM	SURGERY-CCM
Site Requirements			
<ul style="list-style-type: none"> IM and general surgery residencies 	<ul style="list-style-type: none"> IM and general surgery residencies 	<ul style="list-style-type: none"> Requires an ACGME-accredited anesthesia residency at the primary clinical site or an integration agreement with another institution that sponsors an anesthesia residency IM and general surgery residencies 	<ul style="list-style-type: none"> Must sponsor an ACGME-accredited residency program in surgery, pediatric surgery, thoracic surgery, or vascular surgery Desirable to have IM, anesthesiology, pathology, and radiology programs
<ul style="list-style-type: none"> Must have at least 3 of 5 IM-subspecialty programs (cardiovascular disease, gastroenterology, infectious diseases, nephrology, or pulmonary disease) located at primary clinical site 	<ul style="list-style-type: none"> Must have pulmonary disease subspecialty program plus 2 of 4 IM-subspecialty programs (cardiovascular disease, gastroenterology, infectious diseases, or nephrology) located at the primary clinical site 	<ul style="list-style-type: none"> No additional fellowship required 	<ul style="list-style-type: none"> No additional fellowship required
Key Clinical Faculty Requirements			
<ul style="list-style-type: none"> Must have current ABIM certification in CCM 2 KCF if 3 fellows (in addition to program director) 1 KCF:1 fellow for programs with more than 3 fellows. 	<ul style="list-style-type: none"> Must have current ABIM certification in pulmonary disease or CCM (at least 3 KCF must be board-certified in pulmonary disease and at least 3 must be certified in CCM) 5 KCF (in addition to program director) 1 KCF:1.5 fellows if >9 fellows 	<ul style="list-style-type: none"> Faculty must be board-certified in anesthesia or possess acceptable qualifications No mention of KCF 2 more FTE faculty with expertise in critical care Ratio of 1 FTE faculty to 2 fellows must be maintained 	<ul style="list-style-type: none"> No mention of KCF At least 1 surgeon certified in surgical critical care must be appointed to the faculty for every critical care fellow in the program (in addition to program director). Must have current certification in the subspecialty by the American Board of Surgery or possess acceptable qualifications

IM-CCM	PULMONARY-CCM	ANESTHESIOLOGY-CCM	SURGERY-CCM
			<ul style="list-style-type: none"> Nonsurgical physician faculty must be certified in critical care in their specialty area or possess acceptable alternative qualifications
Bronchoscopy Requirements			
<ul style="list-style-type: none"> 50 therapeutic flexible fiberoptic bronchoscopy procedures limited to indications for therapeutic removal of airway secretions, diagnostic aspiration of airways secretions or lavage fluid, or airway management 	<ul style="list-style-type: none"> 100 bronchoscopy procedures 	<ul style="list-style-type: none"> Not required 	<ul style="list-style-type: none"> Not required
EM Trainee Requirements			
<ul style="list-style-type: none"> 75% of fellows must be graduates of an ACGME-accredited IM program averaged over any 5-year period (this means only 25% of fellows can be EM-CCM) EM-CCM fellows must have a minimum of 6 months of IM rotations with at least 3 months in a medical ICU; if these requirements are not completed during EM residency, they must be completed at the beginning of the first year of fellowship 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Fellows who completed EM residency must also complete 1 preliminary year in the surgery program at the institution where they will enroll in surgical critical care fellowship
Clinical Time and ICU Requirements			
<ul style="list-style-type: none"> Minimum 12 months of clinical experiences 	<ul style="list-style-type: none"> Minimum 18 months of clinical experiences 	<ul style="list-style-type: none"> Minimum 12 months of full-time training 	<ul style="list-style-type: none"> 12 months of training

IM-CCM	PULMONARY-CCM	ANESTHESIOLOGY-CCM	SURGERY-CCM
<ul style="list-style-type: none"> At least 6 months of care of critically ill medical patients (i.e., MICU/CICU or equivalent) At least 3 months of care of critically ill non-medical patients (at least 1 month direct patient care) Up to 3 months of MICU/CICU experience obtained during another IM subspecialty fellowship may count toward the 6 months of required MICU/CICU time Any clinical experience done by EM-CCM fellows to fulfill prerequisite IM clinical requirements will not count towards the minimum 12 months of critical care experience 	<ul style="list-style-type: none"> At least 6 months of care of critically ill medical patients (i.e., MICU/CICU or equivalent) At least 3 months of care of critically ill non-medical patients (at least 1 month direct patient care) No more than 15 months of ICU experience 	<ul style="list-style-type: none"> At least 9 months must be spent in the care of critically ill patients in ICUs 	<ul style="list-style-type: none"> At least 8 months must be in a surgical ICU (at least 5 months must be in a unit where a surgeon is the director or co-director) No more than 2 months in nonsurgical ICUs No more than 2 months in elective rotations relevant to critical care

ABIM=American Board of Internal Medicine; ACGME=Accreditation Council on Graduate Medical Education; CCM=critical care medicine; EM=emergency medicine; ICU=intensive care unit; MICU=medical intensive care unit; CICU=cardiac intensive care unit; IM=internal medicine; KCF=key clinical faculty; FTE=full time equivalent

Table 3**Training Barriers for Internal Medicine-Critical Care Medicine Programs**

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1. Requirement that at least 3 of 5 ACGME-accredited IM subspecialty fellowship training programs (cardiovascular disease, gastroenterology, infectious diseases, nephrology, or pulmonary disease) be located at the primary clinical site. This is one more subspecialty program than required by pulmonary-critical care medicine programs.
 2. Exclusion of non-American Board of Internal Medicine critical care board-certified anesthesiologists and surgeons from key faculty status.
 3. Higher key clinical faculty to fellow ratio in critical care medicine (1:1) programs with more than 3 fellows compared to a 1:1.5 ratio for other IM fellowships.
 4. Restriction of fellows who have not trained in an ACGME IM program to no more than 25% of total fellowship positions per program, which limits the ability to train fellows from non-IM ACGME-approved programs (e.g., emergency medicine).
 5. Requirement for non-pulmonary trainees to perform at least 50 therapeutic bronchoscopy procedures.
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ACGME=Accreditation Council on Graduate Medical Education; IM=internal medicine;