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Title: Destination Critical Care: A Road-Map for Academic Clinicians, Educators, and Mentors

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Abstract: The purpose of this manuscript is to provide a framework for academic clinicians, educators, and mentors to advise the emergency medicine resident with an interest in the field of critical care medicine. Prior articles have detailed the prerequisites and specific training curricula of the distinct critical care pathways, but an approach for the advising faculty member in this climate of increased interest in critical care training has yet to be disseminated. In this article, we assume a starting point of emergency medicine residency, and focus on pivotal training and decision points that occur along the path to matriculation into a critical care fellowship program. These decision points are described in stepwise fashion with aligned questions to help the EM resident evaluate individual strengths and desires that may help the decision-making process. We also describe considerations of the post-fellowship job market, as this also plays a role in the fellowship decision-making process.

Destination: Critical Care, A Road-Map for Academic Clinicians, Educators, and Mentors

Timeline Considerations

Formal critical care training is an exceptionally hot topic in emergency medicine (EM)[1]. There are four distinct pathways, each comprising a separate fellowship, to gain certification in critical care medicine after completing a residency in emergency medicine. The four specific pathways consist of Neuro-Critical Care Medicine (NCC), Internal Medicine (IM)-Critical Care, Anesthesia-Critical Care Medicine (ACCM) , and Surgical-Critical Care Medicine (SCCM) [2]. Emergency medicine trained physicians are candidates for all four of these pathways. The decision to embark on a critical care fellowship is one that is often made early during an EM resident's training. Current graduate medical education (GME) structure dictates that for the resident desiring to go directly into fellowship training, he or she must decide on future fellowship with a minimum of 18 months left in residency. Neuro-critical care and anesthesia-critical care fellowship programs require entry into the San Francisco Match 1½ years prior to fellowship matriculation. IM-critical care and surgical critical care fellowship programs accept applications through ERAS (Electronic Residency Application Service) and SAFAS (Surgical Critical Care and Acute Care Surgery Fellowship Application Service) respectively approximately a year prior to fellowship matriculation.[3] [4]While any fellowship decision must be made around the midpoint of residency, the four distinct tracks of critical care fellowship training make the decision more complex. Additionally, the ratio of EM applicants to critical care fellowship positions has been steadily increasing since the acceptance of EM candidates for critical care board certification.[5] So how can we best advise and support our residents seeking fellowship training in this increasingly competitive and popular field of work?

Decision Point 1: Formal Critical Care Training?

There are common themes in critical care that apply to all 4 pathways. These themes include continuity of care, more time with fewer patients, as well as daily rounds and family discussions. Guiding questions important for the EM physician interested in any of the paths toward critical care fellowship include, but are not limited to, the following:

- What do you like about emergency medicine, why did you choose this field?
- What don't you like about emergency medicine?
- What did you like about your ICU rotation?
- What didn't you like about your ICU rotation?
- Where do you align in the balance of time with patients? Do you desire more time with patients?
- Is continuity of care an important part of your practice?
- Are you a detail-oriented physician?
- Do you desire deep physiologic approaches to problem solving?
- How do overnight shifts (typically 7p – 7a) and being on call impact your well-being?
- How do you feel about extended daily rounds on patients, in addition to family discussions?
- How do you approach the death / dying / palliative care process?
- Will your personal life allow you another 2 years of post-graduate training?

These questions allow residents to consider his or her own values, strengths, and weaknesses, as they related to the daily practice of critical care. To answer these questions fully requires some minimal amount of exposure to the ICU setting. No specific array of answers demands a physician should or should not seek formal training in critical care, but these questions do invite a deeper and more realistic rationale to pursue critical care fellowship, beyond reasons of finding critically ill patients "interesting," or the field "exciting."

Decision Point 2: Which Critical Care Track/Fellowship?

Once a decision to pursue a critical care fellowship has been made, the next step is determining which track is best for the individual candidate. Earlier papers have described the updated requirements and inter-fellowship training approaches of the different pathways of critical care fellowship.[5] This paper will not elucidate each of these details, but rather provide an approach to aid in the selection of a

critical care fellowship track. In order to best serve the resident in making an appropriate choice of critical care fellowship, we believe three components are necessary: expanded ICU exposure (including elective time), mentorship, and an organized approach for self-reflection.

Broad descriptions of the different critical care sub-specialties and associated questions may allow a deeper understanding of why one pathway may be preferential over another for an individual candidate (figure 1). The first dividing point, and likely the simplest, is a decision regarding care of medical versus surgical patients. If a candidate has a considerable affinity for surgical patients, either the surgical or anesthesia pathway may be the best fit. Similarly, if the trainee wants to care for patients with respiratory or medically complex issues, the internal medicine critical care pathway may be the better choice. A similar approach applies for the neuro-critical care pathway. If a candidate has a deep desire to care for the neurologically critically ill with both medical, and surgical approaches to care, this decision point may be clear. From the most recent ABEM (American Board of Emergency Medicine) annual report of 2017-2018, overall 5.5% of EM physicians are board-certified in a sub-specialty. There are 49 active board certified EM intensivists in the anesthesia pathway, and 170 from the internal medicine pathway. The numbers of board certified EM-CCM providers is small but increasing each year, with about 30-50 annually taking critical care board exams. Surgical and neuro critical care fellowship and board certification data are not readily available.[5]

To support and advise a resident in choosing which of the four critical care fellowship paths to pursue, adjustments to the resident schedule may need to be made. If possible, knowing which direction a resident is leaning (medical versus surgical) can be helpful when adjusting a schedule to accommodate rotations in different ICUs, ideally early in the second year of residency (or 3rd year if from a 4-year EM residency program). Adding an extra ICU rotation after intern year will give exposure to both the practice of critical care as well as the opportunity to engage current CCM fellows and attendings. This is also a good opportunity to identify intensivists who will write letters of

recommendation. Identifying these persons early and requesting letters at the time of the rotation will improve the ease of application, especially if applying after years in EM practice.

If the resident is considering an anesthesia critical care pathway, exposure to cardiothoracic surgical patients is key, as increasing numbers of these ICUs are staffed by anesthesia trained providers.[6] Likewise, if a resident is considering a surgical critical care fellowship, an elective in a multidisciplinary surgical or burn ICU (as opposed to an exclusively trauma ICU) would be recommended. Other electives that are beneficial are palliative care, renal, and infectious disease, all which give broad exposure to different aspects of critical care. A benefit of the 4-year EM residencies includes more flexibility in scheduling ICU time, and more clinical experience to draw from when making decisions regarding fellowship tracks. Nonetheless, creative ways of scheduling rotations during the first and second years of 3-year EM residency programs can still provide the breadth of critical care exposure needed to inform decisions.

Mentorship is also crucial, and finding physicians from each of these areas of critical care who are willing to discuss the nuances of the field, is invaluable. This may even require looking outside a trainee's home institution, if a dual trained provider is not on faculty. American College of Emergency Physicians (ACEP) section on critical care or Emergency Medicine Residents' Association (EMRA) critical care section may be worth investigating to find a mentor, and both organizations also provide mentorship matching services online, if a mentor is not available at the resident's training institution.[2] Both of these entities also have websites and publications guiding candidates through the application process as well as listing current fellowship and job openings. [7]

Lastly, we recommend an organized approach to self-reflection that includes lists of questions like those mentioned in this paper, a clear timeline to keep track of deadlines for decisions, as well as note-taking or journaling. Even a few words a week regarding a particular case or interaction while on an ICU rotation can aid in recalling the authentic and real-time experience of working in an ICU. Specific questions geared at this decision point include, but are not limited to:

- What do you want your future practice to look like? How will a fellowship get you there?
- Do you find a particular device or procedure desirable to manipulate / understand? (Ex: ventilators, ECMO, dialysis machines, LVADs, ventriculostomy drains)
- Are there groups / teams of providers you feel most comfortable with? (Ex: surgeons, neurologists, pulmonologists, medical-subspecialists)
- Does working in an "open" or "closed" ICU matter to you? Have you had exposure in both of these types of units?

Lastly, showing interest in the field of critical care medicine will help strengthen the candidate's application, and create a solid foundation for a future career. Additional avenues to demonstrate critical care interest include participating in simulations, submitting abstracts to critical care publications, and attending or presenting at critical care conferences.

Post-Fellowship Considerations

Before making the decision to begin a critical care fellowship, one should be familiar with the job market that exists for dual trained emergency and critical care physicians. Like the distinct pathways into critical care fellowships, the job prospects for these pathways are also divergent.

Current Job Trends:

2008 was the most recent survey from ACEP studying the job market for EM-CCM providers. ACEP Critical Care Section is currently collecting updated career data and will publish this in the near future. Some general trends based on this data are:[8]

- 20% of practitioners practice exclusively in an ED (this includes an ED-ICU)
- 25% of practitioners practice exclusively in an ICU
- About 50% of providers practice both ICU and ED with varying percentages of time spent in each location
- 65% of EM-CCM physicians practice in academics while 18% are community practitioners

For physicians interested in working in an academic setting, we recommend simultaneously applying to the respective critical care and EM departments. Those trained in the surgical and neuro pathways logically work primarily in those respective ICUs. Many anesthesia trained providers work in cardiac or surgical ICUs, with smaller numbers working in neuro and medical ICUs. Intensivists trained through the IM pathway may accept positions exclusively staffing a medical intensive care unit (MICU), which would limit the number of surgical ICU opportunities, depending on the amount of exposure during one's fellowship training. The American Board of Internal Medicine (ABIM) requires MICUs involved in training internal medicine residents be staffed only by intensivists boarded through the ABIM pathway[9,10]

Following critical care fellowship, some EM trained physicians choose to practice exclusively emergency medicine, or exclusively critical care. Additionally, a few institutions have developed ED-ICUs, which will be other areas for the EM-intensivist to seek employment. [11] Staffing models of these units can vary by institution, depending upon whether the hospital requires a board certified intensivist or an EM provider with extra training.

Practicing emergency medicine and critical care in private or community settings may mean working for two separate groups (if the hospital does not own both practices). Private practice critical care jobs are increasing in number,[12,13] and the majority of these jobs will be work in a mixed medical-surgical ICU. While the presence of advanced practice providers (APPs) are increasing in the field of emergency medicine and critical care, this demographic of providers is particularly prevalent in the community or private practice setting. Experience working with APPs is a practice that ought to be sought out, especially by those interested in a community practice.

Contract and Schedule Negotiations:

Complicated logistics often exist with respect to hiring and departmental ownership, particularly in the academic setting. Negotiating job contracts with each group or department can be complex. Each group or department has certain full-time equivalent (FTE) "currency," meaning that a 1.0 FTE position may require more work-hours in one department compared to another. Employee benefit plans are often only offered by one department and may require greater than a 0.5 FTE position with that department to receive benefits. Similarly, promotion requirements and incentive opportunities will differ between departments. Depending on the hospital's intensive care model, the intensivist may be on duty for a full week, with home call, or may perform shift coverage with fixed hours.

Scheduling between two departments can be complex depending on the system each department uses. Some intensivists prefer a standardized ICU week (i.e. the first week of every month) while others have varying pre-coordinated ICU time. Holiday schedules and expectations is another area of complexity, as both departments often require some holiday commitment. Many of these complexities are simplified when one of the two departments "owns" the employee's primary academic assignment.[1]

Compensation models

Compensation models vary among academic and private/community practices. Typically, each department or group will have a baseline salary, with incentive options based on Relative Value Units (RVUs) billed, quality metrics, and possibly specific procedures performed. Additionally, it is common for groups to have nighttime differentials, meaning that providers working the overnight shifts get compensated at higher rates.

Conclusions:

With the rapid technical and pharmacological advances seen in medicine of late, critical care trained physicians offer a unique skill set, and will continue to be in high demand. There is a national shortage of intensivists, although the magnitude of this shortage is difficult to determine.[8 14] Not only are ratios of intensivists: patients needing critical care falling, the complexity of the care being provided in ICUs continues to rise.[8 15] One study quoted the need for 1,500 new ICU physicians by 2020[14]. Accordingly, there are increasing numbers of fellowship training spots, yet many go unfilled[6]. While we call for further studies examining the interest, job prospects, and job satisfaction for EM intensivists, we hold a unique opportunity to guide and mentor our residents into both a highly desired and indispensable discipline of medicine.

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