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# Intensive Care Fellowship Training in the United States of America

## Amerika Birleşik Devletleri'nde Yoğun Bakım Eğitimi

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**ABSTRACT** This article provides a general overview of the pathway to become an intensivist in the United States of America (USA). It begins with a detailed description of the current structure of critical care training in the USA and the application process to fellowship training programs. There is then a presentation of the general structure of critical care units within the USA and how intensive care unit physicians fit into it. The article concludes with a discussion of how American critical care fits globally within international critical care societies.

**Keywords:** Critical care, fellowship, intensivist, ICU, training, education

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**ÖZ** Bu makale Amerika Birleşik Devletleri'nde (ABD) yoğun bakım uzmanı olmanın yolu hakkında bilgi vermektedir. ABD'deki yoğun bakım eğitiminin mevcut yapısının ve eğitim programlarına başvuru sürecinin ayrıntılı bir açıklamasıyla başlamaktadır. Daha sonra ABD'deki yoğun bakım ünitelerinin genel yapısına ve yoğun bakım ünitesi doktorlarının bu yapıya nasıl uyum sağladığına dair bir sunum içermektedir. Makale, Amerikan yoğun bakımının uluslararası yoğun bakım toplulukları içerisinde küresel olarak nasıl yer aldığı tartışılmasıyla son bulmaktadır.

**Anahtar Kelimeler:** Yoğun bakım, burs, yoğun bakım uzmanı, YBÜ, eğitim

### Introduction

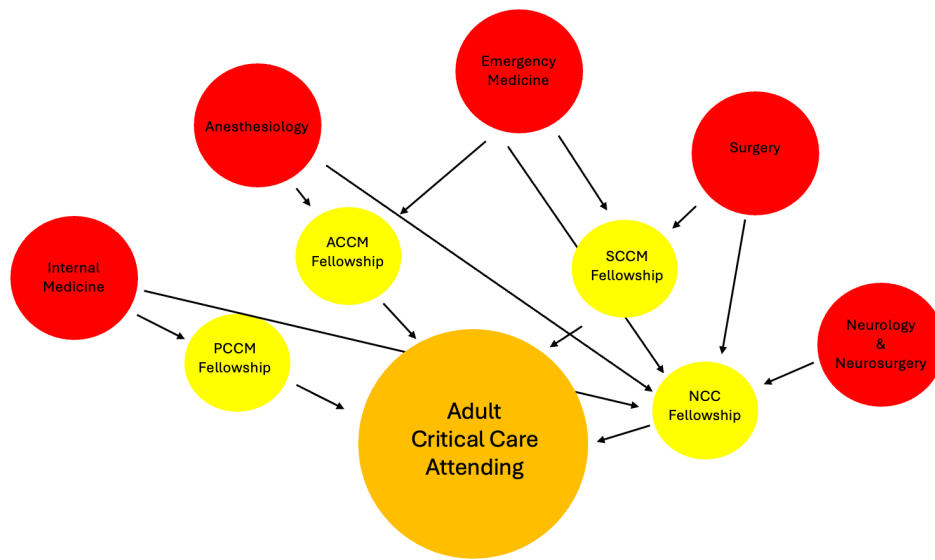
Aging of the general population is a problem confronting medical systems across the world, posing an impending need for increased critical care services. In the United States of America (USA), estimates suggest that there will be a worsening shortage of critical care providers within the next 10 years (1,2). Given that intensive care units (ICUs) with in-house intensivists are associated with lower mortality and reduced hospital and ICU length of stay (3), there is continued demand for increased critical care training programs to provide this needed supply of intensivists. In the United States, intensivist training spans many different healthcare specialties and could grow to include more as the demand for intensive care increases. The traditional route to becoming an intensivist in the USA was via specialty training in internal medicine, surgery, or anesthesiology followed by a fellowship of 1 to 3 years duration. Pathways to a career in intensive care have expanded to include other specialties such as neurology and emergency medicine (EM) (Figure 1) and may diversify further to accommodate increased demand.

The following article provides a general overview of the pathway to becoming an intensivist in the USA. It begins with a detailed description of the current structure of critical care training in the USA and the application process to fellowship training programs. It then discusses overall fellowship popularity and the general structure of critical care units within the USA and concludes with a discussion of how American critical care fits globally within international critical care societies.

### Intensivist Training Pathways in the United States of America

For most USA medical trainees, specialty training begins after obtaining a 4-year medical degree in either allopathic (Doctor of Medicine) or osteopathic (Doctor of Osteopathic Medicine) medicine. A newly graduated physician must then enter residency that is accredited by the Accreditation Council for Graduate Medical Education (ACGME), an independent organization that sets the professional standards for post-graduate physician training programs and monitors compliance with these standards (4).





**Figure 1.** Integration of specialties in adult critical care  
 SCCM: Society of Critical Care Medicine, ACCM: Anesthesiology & Critical Care Medicine

Currently, the medical specialties that have an ACGME-accredited critical care fellowship are anesthesiology, internal medicine, general surgery, and neurology. Pediatrics has ACGME-accredited training programs in pediatric critical care and neonatal-perinatal medicine, which are critical care subspecialties outside of the scope of this article. Entry to an ACGME fellowship program requires completion of a residency program that is either accredited by the ACGME, or approved by the American Osteopathic Association, ACGME-International, Royal College of Physicians and Surgeons of Canada, or College of Family Physicians of Canada (5-7).

Regardless of the initial specialty of entry, the ACGME has general requirements that apply equally to critical care fellowships across all specialty fields. Each program must set competency-based goals and objectives and progressively increase responsibility throughout the duration of fellowship. Rather than specifying a particular curriculum that must be identical in all fellowships, the ACGME provides a list of “competencies” in which it expects all fellows to be able to practice by graduation (5-7), which are summarized in Table 1. Each subspecialty then individualizes these competencies further, as described below:

### **Pulmonary Critical Care**

Pulmonary and critical care medicine is a three-year fellowship for graduates of internal medicine residency that trains fellows in the dual specialties of pulmonary

medicine and critical care. The curriculum includes the core competencies (see Table 1) plus an extensive list of pulmonary pathologies and procedures. For example, these fellows must be well-versed in pulmonary vascular diseases, malignancies of the lung, and pulmonary manifestations of systemic diseases such as collagen vascular diseases (6). The curriculum also specifies that fellows must have procedural competence in ventilator management, bronchoscopy requiring biopsy, and pulmonary function testing as these are pertinent to the practice of pulmonology (6). Pulmonary critical care fellows are also required to have exposure to the management of surgical critical care patients, specifically the “hemodynamic and ventilatory support” (6) of perioperative patients.

### **Anesthesiology Critical Care**

For graduates of anesthesiology residency, critical care fellowship is a one-year program. While anesthesiology residents in the USA have significant exposure to critically ill patients both in the operating room and during their rotations in the ICU, they are not eligible to take critical care boards unless a fellowship is completed. Anesthesiology critical care fellowship requires mastery of the core competencies for critical illness of each organ system (see Table 1) but less extensive procedural mastery of the pulmonary system, as anesthesia intensivists are not expected to carry out pulmonologist procedures such as bronchoscopy with biopsy. Some areas in which the

**Table 1. Summary of ACGME core competencies shared among the different critical care fellowships**

Competency	Additional details
Acute lung injury	ARDS, inhalational and traumatic injury
Acute metabolic disturbances	Overdoses, Intoxication
Anaphylaxis, Allergic reactions	
Cardiovascular diseases	
Circulatory failure	Cardiorespiratory resuscitation
Coagulation, blood disorders	
Nosocomial/iatrogenic ICU problems	
Pulmonary disease	
End-of-life and palliative care	
Immunosuppressed ICU conditions	
Nutritional and endocrine effects of critical illness	
Peri-operative critical illness	
Psychosocial and emotional effects of critical illness	For both patients and families
Renal disorders of the ICU	Electrolyte and acid-base disturbance, acute renal failure
Sepsis	
Shock syndromes, multi-organ failure	
ACGME: Accreditation Council for Graduate Medical Education, ARDS: acute respiratory distress syndrome, ICU: intensive care unit	

anesthesiology curriculum requires more focused expertise in the areas of complex airway management (to include video laryngoscopy and fiberoptic approaches), as well as competency in management of the obstetric, burn and trauma patients (7).

### **Surgical Critical Care**

Like anesthesiologists, surgeons have the option of a one-year fellowship to be certified as intensivists, with a similar ACGME curriculum. In addition to the core competencies, the curriculum for surgeons focuses primarily on pathologies that would be found in a surgical ICU (SICU), including trauma, burn, and obstetrics. This curriculum goes so far as to specify a required amount of time that trainees must spend specifically in a SICU, and that "experiences in non-SICUs, such as medical...must not exceed 2 months (5)."

### **Neurosciences Critical Care**

Neurocritical care has a separate fellowship focused on patients with critical illness resulting from neurologic disease, trauma, or neurosurgery (8). This fellowship on its own is 24 months in duration but may be completed in 12 months if the trainee has already completed one of the above-mentioned critical care fellowships, or if the trainee has completed residency in neurosurgery (8). As the pulmonary critical care fellowship places additional emphasis

on training in pulmonary conditions, the neurocritical care fellowship places additional emphasis on care of the neurologic patient with such skills as intracranial pressure monitoring, interpretation of EEG and evoked potentials, and cerebrospinal fluid analysis (8).

### **Emergency Critical Care**

EM physicians also contribute to the critical care work force and most recently reinvented the training path to become an intensivist. There is no ACGME-accredited critical care fellowship specifically for EM graduates, so these physicians must complete one of the above-mentioned fellowships. The only fellowship for which they are ineligible is pulmonary critical care, as they have not completed internal medicine training and therefore cannot work as pulmonologists. As there is no dedicated fellowship for emergency physicians, there is also no dedicated board exam and so upon completion of fellowship, EM physicians must sit for the board exam corresponding to their fellowship of choice (9).

### **Specialty ICUs Without ACGME-accredited Training**

Many USA hospitals, especially academic institutions, have highly specific ICUs that fall outside the realm of specialties presented above, such as cardiac, cardiovascular surgical, and burn ICUs. While there are not specific

fellowships tailored to every type of ICU, these units generally hire providers from clinically relevant fields. For example, the cardiac surgery ICU may hire anesthesiologists who have done fellowships both in critical care and cardiac anesthesiology. Additionally, the unit may hire cardiac surgeons who have completed ICU fellowship, forming a staff group of physicians with diverse backgrounds and skill sets.

### **Application Process**

Application to fellowship in the US is much like application to residency: potential fellows must go through a match process. Most programs utilize the Electronic Residency Application Service hosted by the American Association of Medical Colleges (AAMC), and applicants must compile an extensive application including board exam scores, recommendation letters, and a personal statement. The AAMC has a detailed listing of all participating institutions and their specific application requirements on its fellowship application webpage (10).

### **Certification Process**

Board certification in critical care medicine is required to work in the ICU, and each specialty pathway has its own distinct certification process. For example, board certification is offered by the American Board of Internal Medicine (ABIM) for pulmonary critical care physicians (11), the American Board of Anesthesiology for critical care anesthesiologists (12) and the American Board of Surgery (ABS) for critical care trained surgeons (13). Neurocritical care certification is offered through the ABS, the American Board of Psychiatry and Neurology (ABPN) (14) and the American Board of Neurological Surgery (ABNS) (15). Finally, EM physicians may take any of the above-mentioned board exams, as over the past two decades the American Board of Emergency Medicine has joined forces with these other board organizations to allow emergency physicians to sit for the critical care board exam. The ABIM was the first to allow EM physicians to sit for its critical care board in 2011, with all other specialties following suit, most recently with the ABPN allowing certification for EM physicians in 2021 (9).

Board examinations are generally offered annually, with most physicians opting to complete this step in the first 1-2 years after fellowship. There may be a time limitation, like the ABS post-fellowship eligibility period of seven years (13). Certain boards, such as the ABS and ABIM, may accept

some candidates with international training if particular criteria are met; others, such as the ABPN, do not.

### **Demographics of Intensive Care Units Across the USA**

The American Hospital Association lists over 5000 hospitals that have at least one intensive care bed and reports an average ICU size of 10-12 beds (16). ICU size is likely to change correspondingly with hospital size, and tertiary care tertiary care academic centers with 300-500+ beds are likely to have at least 2-3 distinct ICUs subspecialized to their primary patient populations. This could include the medical ICU, SICU, cardiac care unit, cardiovascular SICU, neurological critical care unit, pediatric ICU, neonatal ICU, and burn ICU, among others (17-19).

Given the over 112,000 ICU beds across the USA with 4.5 million ICU admissions annually, the demand for intensivists remains high. While in the past, critically ill patients may have been cared for by a generalist like an internist or surgeon, many studies over the past few decades show improved outcomes when ICU patients are cared for by a physician with critical care training (17,18). These outcomes include decreased mortality, increased survival, decreased ICU length of stay, and decreased hospital length of stay (20). However, ongoing staffing shortages, especially after the COVID-19 pandemic, reduce supply for 24-hour intensivist coverage, threatening care for some of the hospital's most vulnerable patients.

This staffing strain is most heavily concentrated in rural and low-income areas, as academic centers in larger metropolitan areas are more likely to have a consistent influx of recently graduated critical care physicians. Some hospitals have adopted creative strategies for addressing this such as employing telehealth intensivists as consultants for the primary medical or surgical team. These tele-intensivists join critical care rounds over video and provide virtual consultation to non-ICU trained physicians. The COVID-19 pandemic popularized the use of telehealth services to extend resources beyond geographic constraints; however, technology limitations remain a challenge in lower-resource settings, especially areas with unstable internet connectivity.

### **Advanced Practice Providers in Intensive Care**

One strategy to address the ICU physician shortage is the utilization of advanced practice providers (APPs) or "midlevel providers" with critical care training. In the USA, APPs are healthcare professionals who have undergone

additional advanced training and work in collaboration with or under the supervision of a physician. While APPs work in many hospital settings (for example, nurse anesthetists in the operating room and nurse midwives on labor and delivery), there are only two categories of APPs who work in the ICU: acute care nurse practitioners (ACNPs) and physician assistants (PAs) (21). Both ACNPs and PAs must obtain a graduate degree (either masters or doctorate) that includes both didactic course work and clinical rotations as well as apprentice-like experience in the ICU (22,23). Both PAs and NPs are credentialed to perform technical skills, like central lines and intubations, as well as clinical skills, like ventilator management (23).

Since the time required to train PAs and NPs to work in the ICU, approximately 2-5 years, is shorter than that to train an intensive care physician, leveraging a multidisciplinary workforce can help expand the reach of the current intensivists (21) and address the ongoing and increasing demand for intensive care providers.

### **Job Prospects**

The diversification of and increase in fellowship spots has created an intensive care workforce of physicians from various backgrounds and with different career goals (21). These physicians may choose to practice in community settings or academic hospitals, or even both. They may choose to work in one sub-specialized ICU, like the cardiac SICU, or a mixed medical-SICU. Contracts may only include ICU time, or split time with another specialty, such as operative time for surgeons or clinic time for pulmonologists. According to a 2023 survey, about half of intensivists spend more than 75% of their clinical time in the ICU, with others spending more or less, some significantly less (24). Some intensivist jobs may even include telehealth consulting for hospitals that can't staff full-time ICU physicians (25). Call structure may include 24-hour coverage with either in-hospital or home call; alternatively, two intensivists can split the coverage into 12-hour shifts to allow for shorter work hours.

An intensivist may work with a team including APPs, physician trainees, or a combination of the two. Community hospitals are likely to have intensivists working solo or with APPs, while academic centers will likely have the intensivist supervising residents and/or fellows. In both models, the trainee physicians or APPs are primarily responsible for placing orders, writing notes and are often the first line of contact for questions from nurses or other members of the

care team, with the intensivist acting in more of a supervisory or consulting role. Physicians pursuing critical care training should be prepared to work on a truly multidisciplinary team with APPs, residents, and/or both, especially as the landscape of critical care medicine evolves and the need for increased staffing continues.

### **Graduates of International Medical Schools**

In general, most physicians who apply for critical care medicine fellowship in the USA have completed an ACGME-accredited residency, as described above. However, non-USA medical graduates may be considered if they have completed a core residency outside the continental USA and demonstrated clinical excellence and exceptional qualifications including research, scholarship and/or leadership. Verification of credentials is done through the Educational Commission for Foreign Medical Graduates (5-8). It is worth noting that board certification in critical care medicine may require additional documentation or approval for those who have not completed an ACGME-accredited residency.

### **Critical Care Societies, Global Impact, Government Involvement**

Given the diverse backgrounds of ICU physicians, multiple professional scientific societies exist to promote community in critical care. Nationally, the Critical Care Society Collaborative (CCSC) is a coalition of four societies: American Association of Critical-Care Nurses, American Thoracic Society, American College of Chest Physicians (CHEST), and Society of Critical Care Medicine (SCCM). Each has a distinct member population and lens for approaching critical care medicine. The coalition, CCSC, functions to harmonize and unify the societies; together, they work with the USA government, the Centers for Disease Control and USA Department of Health and Human Services on healthcare policy, improving patient care, optimizing high-value care, and addressing workforce issues (26).

Two USA critical care societies, SCCM and Neurocritical Care Society, belong to the World Federation of Intensive and Critical Care (27). There is a robust global intensive care community, including the Asian Society for Neuroanesthesia and Critical Care, the Pan-American and Iberian Federation of Critical Medicine and Intensive Therapy (FEPIMCTI), the Critical Care Society of Southern Africa and the European Society of Intensive Care Medicine which offers dual membership to national intensive care in more than 60 countries across the world (28). Beyond offering

international collaboration on research, innovation and clinical advancement, there is also a sense of solidarity, shared resources, and educational opportunities.

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## Conclusion

As the population of the USA ages and develops more complex healthcare needs, the demand for intensive care physicians is quickly outpacing the supply. The training pipeline to become an intensivist spans at least 9-11 years, including medical school, an ACGME-accredited residency program or a valid alternative, and a critical care fellowship with respective board certification. While a variety of specialties can lead to a career in critical care medicine, each pathway comes with a slightly different lens, patient population, and practice structure. Innovative responses to the demand for intensivists include tele-health consulting and the inclusion of APPs to help extend the reach of each fully trained intensivist. There are opportunities for non-USA trained physicians to pursue critical care fellowship training

and board certification in the USA, with specifications outlined by the ACGME and specialty-distinct certifying bodies. Although there are several different and historically separate intensive care societies in the USA, there is a growing movement to align these societies together for improved cohesion, collaboration, and cooperation with each other and the international community to promote global initiatives to improve the care of critically ill patients worldwide.

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## Ethics

### Authorship Contributions

Concept: M.R.G., Design: M.R.G., Literature Search: M.R.G., R.E.T., Writing: M.R.G., R.E.T.

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