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Critical Care Education: How Early Is Too Early?

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Critical care has a young history of serving the needs of the most complex patients. The first intensive care unit (ICU) was established in the United States in 1959.[1,2] Critical care has now extended into additional medical domains, specifically neonatal, pediatric, neurological, surgical, cardiac, and trauma being among the few common examples. This vast range of critical care specialization resulted in precision of care tailored to each individual patient suffering from a variety of ailments. Hospital systems have also started expanding ICUs to meet the demands fueled by the COVID-19 pandemic, bringing intensivists out of urban tertiary care facilities, and leading them directly to the communities, either physically or through telemedicine.[3] Because of its complexity, critical care education is regularly taught later during medical training, often while in residency or fellowship. However, can these sophisticated concepts be broken down into digestible components and taught earlier to medical students and interns?

The stunning reality is that medical students have very limited exposure to intensive care medicine.[4] As mentioned previously, this field is generally not accessible to a student until they decide to pursue a residency or fellowship, in which it is usually part of their standard curriculum.

However, the concepts of physiology, navigating ethical challenges, utilizing modern medical technology while understanding its limitations, eliciting our patients' goals of care, and breaking down complex cases into workable parts are displayed daily on ICU rounds. These important concepts taught during an ICU rotation or by other methods may provide students with cognitive training and in-depth understanding to solutions for daily medical problems and tasks. It is difficult to gauge how much exposure to scientific knowledge a medical student requires to be successful in their future practice due to the limited research on this topic.

Current medical curricula have become so extensive and broad that only individuals with an invested interest in critical care seek the opportunity to acquire the specialty specific knowledge and skillset. However, those individuals also risk losing insight to the depth and complexity of medicine as a whole if they focus only on specific critical care topics. Regardless, the standardized exposure to common treatments, concepts, procedures, and methodologies of intensive care may improve medical students' critical thinking, decision making, and overall confidence as they begin their careers.

The delicate matter of introducing complex critical care aspects such as advanced resuscitation to learners with little or no foundation requires a stepwise approach, which builds on the fundamental anatomical and physiological concepts taught in

medical school. The AAEM/RSA's Introduction to Critical Care and Anesthesia (ICCA) course, targeting M3, M4, and PGY-1 residents, attempts to bridge this educational gap by utilizing the core axioms of the basic sciences and connecting this to the understanding of advanced topics, such as extracorporeal membrane oxygenation (ECMO), mechanical ventilation, and hemodynamic monitoring (see box).

There is minimal data exploring the relevance of early critical care education for physicians-in-training. However, a similar notion was utilized in undergraduate nursing instruction where an "Integrated Nursing Care" module, which explored the early detection and acute management of the deteriorating patient, was incorporated into year three of their four-year program. It was found that the early introduction of managing deteriorating patients was essential to improve nurses' competence and confidence when dealing with this patient population.[5] Applying the notions found in this nursing care module may provide evidence for familiarizing medical students with critical care concepts.

The information can be presented as early as the basic science years of medical school through an incremental model, improving the students' practical understanding of these topics, especially when they inevitably must confront issues in practice.

Critical care is a vastly growing subspecialty of medicine that is in high demand nationwide.

Introduction to Critical Care and Anesthesia Course Syllabus

Online Flipped-ClassroomLectures

- Analgesics, Sedatives, and Paralytics
- Arterial Blood Gas (ABG's), Basic Chemistry Panel, and CBC Interpretation
- Oxygen Therapy and Ventilation
- Intra-aortic Balloon Pumps (IABP)and Extracorporeal Membrane Oxygenation (ECMO) and Central Line Insertion
- Pediatric and Neonatal Critical Care
- Hemodynamic and Intracranial Pressure Monitoring
- Cardiac Pacing and ImplantableCardiac Devices
- Fluid Therapy and Massive Transfusion
- POCUS Course (Optional)

Practical Sessions at AAEM22:

- Advanced Airway Management
- Ventilator Management

Medical students may benefit personally and professionally by having additional experiences in critical care prior to the start of residency or fellowship. Early exposure to intensive care medicine will solidify their ability to incorporate various aspects of medicine, hone their critical thought process, and further enhance their interpersonal skills, which are all crucial during residency, fellowship, or even in practice as a licensed physician. Additional investigations and curricula (such as the proposed course) should be explored in order to find the best educational plan that prepares our future physicians for the increased aging and dynamic world of tomorrow's health care realm.

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