

Critical care medicine as a subspecialty of emergency medicine

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Introduction

L'exercice de la médecine d'urgence a changé de façon dramatique au cours des vingt dernières années. Elle continue toujours d'évoluer et le rythme des changements s'accélère. Il y a vingt-cinq ans, les patients qui visitaient un département d'urgence avaient peu de chances d'être traités par un médecin qui possédait plus que les connaissances minimales sur la façon d'identifier, stabiliser et réanimer les malades dont la vie était en danger.¹ La spécialité de médecine d'urgence a vu le jour en raison d'une frustration face aux piètres normes pour les soins d'urgence et parce que des médecins dévoués s'inquiétaient du manque de préparation reçue à l'université pour affronter la réalité au département d'urgence.^{1,2} Avec le temps, plusieurs sur-spécialités ont évolué, notamment les soins pré-hospitaliers, la toxicologie et la médecine du sport. La médecine des soins critiques est également devenue une sur-spécialité de la médecine d'urgence, ce qui n'est pas surprenant puisque les urgentologues administrent un pourcentage substantiel des soins critiques.³

Introduction

The practice of emergency medicine has changed dramatically over the last two decades. It continues to evolve and mature, and the pace of change is increasing. Twenty-five years ago, patients who entered an emergency department had little chance of being cared for by a physician who had more than minimal knowledge of how to recognize, stabilize, and resuscitate patients with life-threatening illness.¹ The specialty of emergency medicine arose because of frustration about the low standards of emergency care and because committed physicians were concerned about how

poorly medical school prepared them for life in the emergency department.^{1,2} Over time, several subspecialty areas have evolved, including prehospital care, toxicology and sports medicine. Critical care medicine has also become an emergency medicine subspecialty — not surprising, because emergency physicians deliver a substantial amount of critical care.³

Emergency medicine and critical care medicine — a comparison

Emergency medicine (EM) and critical care medicine (CCM) share much in common. They began at about the same time and progressed along parallel and overlapping courses of recognition and development.⁴ Both are primarily concerned with acute deterioration, and both were heavily influenced by the explosion of resuscitation research beginning in the 1960s. Both rely heavily on a pathophysiologic approach to single or multi-system dysfunction. Unlike most other specialist groups, emergency and critical care physicians do not limit themselves to one organ of interest, but deal with derangement of any and all organ systems. Critically ill patients often have multiple inter-related problems, requiring a breadth of understanding without which the choice of therapy is likely to be counter-productive.⁵ The similarities between EM and CCM are readily apparent if one considers Grenvik's description of critical care medicine⁶ and substitutes "EM" for "CCM" and "ED" for "ICU."

"CCM is a multidisciplinary endeavor that crosses traditional departmental and specialty lines inasmuch as the problems encountered in the critically ill patient encompass various aspects of many different specialties. The CCM physician is a specialist whose knowledge is of necessity broad involving all aspects of the management of the criti-

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cally ill patient and whose base of operation is the ICU. The body of knowledge considered to be the core of the proposed specialty of CCM can be categorized within major organ systems or conditions which are not unique to, but common among, the critically ill patients.”

While the similarities between EM and CCM are striking, there are also significant differences. Emergency physicians (EPs) primarily treat patients with minor illnesses and injuries, but intensivists almost exclusively treat critically ill patients. EPs have relatively brief involvement near the onset of critical illness; intensivists have more prolonged involvement later in the course of illness.

Critical care in the ED: the present

Emergency medicine evolved because no adequate system existed to care for acute critical illness, but EDs now serve other purposes. In addition to being resuscitation centres for victims of trauma and severe medical illness, EDs function as convenient primary and extended-hours care sites. Between 1960 and 1990, in the United States the annual number of ED visits increased from 42 million to over 92 million — most of these non-emergent.^{7,8} Recent studies indicate that half of all ED visits are non-urgent,^{9,10} but that ED acuity levels may now be rising.¹⁰

Over the years, growth of the non-emergent population in the ED shifted focus and resources away from the care of patients with life-threatening emergencies. In addition, EP remuneration mechanisms make it more financially rewarding to treat multiple patients with minor problems, which decreases emphasis on care for the critically ill. The infrequent occurrence and unpredictable nature of critical illness has limited support for, and experience with ED critical care delivery.⁷ In fact, some have suggested that EDs be relieved of the “disruptive” visits requiring resuscitation or critical care.¹¹

Although most ED visits are non-emergent, EDs deliver a substantial amount of critical care. In low-acuity departments, critically ill patients account for approximately 1% of visits,¹² but in urban teaching hospitals, this figure rises as high as 8.5%.^{13,14} EPs frequently perform critical care procedures, and the ED procedural spectrum is similar to that of the intensive care unit (ICU).^{8,12-15} From 31% to 70% of critically ill ED patients require mechanical ventilation,^{8,14,15} and the ED is a major source of ICU admissions.¹⁶

But limited ICU bed availability is a common problem and ICU patients are often held in the ED, contributing to ED overcrowding.¹⁷ Critically ill patients typically spend 145 to 367 minutes in the ED,^{8,13,15,18} and stays of up to 18 hours^{8,13,15} are reported. One Austrian ED reported an average ED stay of 1.1 days for critically ill patients and a

cumulative mechanical ventilation time of 22 h/day.¹⁴ Some EDs deliver the equivalent of hundreds of patient-days of critical care per annum.^{12,13} Despite this, EDs are generally staffed and equipped only for short-term stabilization; consequently, substandard monitoring practices have been documented for critical care patients in the ED.¹⁸⁻²¹

If EDs are expected to deliver critical care, they should be equipped and staffed to do so. If EPs are expected to deliver critical care, they should be trained, recognized and compensated as critical care providers.¹² EM residents do undergo some critical care training,^{22,23} but the assessment and management of critically ill patients beyond the resuscitation phase have not been a priority; nor has this been emphasized in EM training.^{8,24} For example, given the prevalence of mechanical ventilation in the ED, emergency physicians should receive comprehensive training in the application, monitoring, and trouble-shooting of ventilators; yet, many common EM textbooks lack even a rudimentary discussion of the topic.⁸

Just as prehospital care can influence a patient's ED course, ED care can profoundly affect a patient's progress in the ICU.²⁵⁻²⁹ The traditional phases or divisions between prehospital, emergency and intensive care have always been artificial.³⁰ If “seamless critical care,” as envisioned by Safar,^{31,32} is to become a reality, then bonds between emergency and critical care medicine should be strengthened. Critically ill patients must be moved quickly and efficiently from prehospital stabilization to advanced primary ED resuscitation to secondary ICU resuscitation and stabilization. Paramedics and EPs can often achieve an equilibrium that is the job of CCM to maintain until the patient can reassume responsibility for his or her own physiologic regulation.³¹⁻³⁶

Collaboration is required to achieve excellence in the care of the critically ill and injured. EPs and intensivists need a greater understanding of each other's discipline. Critical care knowledge, practices and techniques could enhance ED care of the critically ill, and the converse is also true. Stronger links in clinical care, education and research — particularly in areas of shared interest such as resuscitation — are necessary. At the university level, the liaison between the two should improve and strengthen resident education and training.

The EM – CCM training continuum

The Royal College of Physicians and Surgeons of Canada recognizes CCM as an “area of added competence.” Residents become eligible for 2-year CCM fellowships after completing at least 3 years in their base specialty. It has been suggested that EM training may be one of the best back-

grounds for CCM specialization,³¹ and the Royal College has recognized emergency medicine (along with internal medicine, surgery, respirology, anesthesiology and pediatrics) as an acceptable base training program for CCM eligibility. EM residents can now combine their final years of EM and CCM to finish both programs in a total of 6 years.

EM has also been recognized as an acceptable base for CCM training in the United States. Early in 1998, the American Board of Emergency Medicine (ABEM) and the American Board of Internal Medicine (ABIM) initiated discussions focusing on the interface between internal medicine, emergency medicine and the subspecialty of critical care medicine. The boards recognized that, as the practice of medicine is rapidly changing, the opportunity may arise to develop a new training option for physicians and improve patient care. Using the already established EM/IM combined training as a template, they developed recommendations for integrated training. The objectives of this training include preparing physicians for hospital-based practice and for academic careers addressing the spectrum of illness and injury from hospital entry to discharge. ABEM and ABIM have recently approved guidelines for a 6-year training program that provides physicians the option for triple certification in EM, IM and CCM.³⁷

The future

During the last 10 years, EDs have made few major advances in the way they treat critically ill patients. The role of the EP has been limited to identifying life threats and stabilizing the ABCs. Emergency physicians generally provide oxygen, intubate, initiate fluid resuscitation and administer vasopressors, using crude endpoints like blood pressure, heart rate and respiratory rate to assess response and determine ongoing therapy. Following initial stabilization, EPs transfer their patients to the ICU as soon as possible for more advanced titration of care. It is often impractical to place Swan–Ganz catheters or arterial lines in the ED, and there are few other monitoring techniques available to provide more sophisticated information to guide ED resuscitation. These limitations often cause interruptions and delays in patient care, but this situation will hopefully change in the near future.²⁵

ED access to vital diagnostic information is rapidly improving. Imaging techniques are becoming faster, more portable and more accurate. New noninvasive monitoring techniques, including central venous oximetry,^{26–28} impedance cardiography,³⁸ thoracic electrical bioimpedance^{39,40} and esophageal Doppler cardiac output determinations^{41–43} will soon allow EPs to monitor sophisticated real-time

physiologic data previously available only in ICUs and operating rooms.^{39–42,44} This will help us refine our therapeutic measures^{25,45,46} and provide immediate advanced resuscitation in the ED. However, to provide state-of-the-art care, future ED physicians will require a greater understanding of basic science and pathophysiology. They will be asked to provide early, aggressive, appropriate interventions.²⁵ It will no longer be acceptable to simply make a disposition decision and stabilize the patient.

Although EDs will continue to see large numbers of patients with minor complaints, there are increasing efforts to divert low-acuity patients to other care settings. Regionalization of critical care resources may mean that patients will be triaged to specific centres of excellence — not just for trauma, but for cardiovascular diseases, stroke, burns, and other illnesses that require specialized investigations and treatment.^{7,46} The EM skills that will be most valued in the future will be the ability to intervene more effectively in acute critical illness.

Conclusions

In Canada, CCM has become a recognized subspecialty of emergency medicine. Unlike other more established specialties, EM and CCM require both horizontal breadth and vertical depth of knowledge. Emergency medicine and CCM are important links in the chain of treatment of the critically ill, and critical care is an essential component of ED practice. This reality mandates that emergency physicians receive appropriate training and that EDs be staffed with adequately trained personnel. Cooperative measures between EM and CCM are required to improve the care of the critically ill and injured. Links in common research areas, such as resuscitation, should be strengthened.

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