

Brief Overview on Critical Care Medicine and Its Intensive Care Units

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Editorial

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EDITORIAL

Critical care medicine is a medical specialization that treats critically ill or critically injured patients who are at danger or recovering from life-threatening disorders.

If a patient's medical needs exceed what a general hospital ward can provide, they are admitted to the intensive care unit. Blood pressure support for cardiovascular instability (hypertension/hypotension), sepsis, post-cardiac arrest syndrome, or certain cardiac arrhythmias are all indications for the ICU ^[1]. Airway or ventilator support is also required in the ICU due to respiratory compromise.

The cumulative effects of multiple organ failure, also known as multiple organ dysfunction syndromes, necessitate advanced care and there are various types of intensive care units.

Intensive care is typically provided in a hospital's specialised unit known as the Intensive Care Unit (ICU) or Critical Care Unit (CCU) ^[2]. Many hospitals also have intensive care units dedicated to specific medical specialties. The naming is not strictly standardised, and the types of units are determined by each hospital's needs and available resources.

These are some examples:

- Medical Intensive Care Unit, Coronary Intensive Care Unit (CCU or CICU) for heart disease (MICU).
- Intensive Care Unit for Surgery (SICU).
- Intensive Care Unit for Children (PICU).
- The Neuroscience Critical Care Unit (NCCU) is an Intensive Care Unit (ICU) in the Emergency Department (E-ICU).

Medical research suggests a link between ICU volume and the quality of care provided to mechanically ventilated patients [3,4]. After controlling for illness severity, demographic variables, and ICU characteristics (including intensivists staffing), higher ICU volume was significantly associated with lower ICU and hospital mortality rates. Adjusted ICU mortality (for a patient at average predicted risk of ICU death) was 21.2% in hospitals with 87 to 150 mechanically ventilated patients per year, and 14.5% in hospitals with 401 to 617 mechanically ventilated patients per year.

Bjrn Aage Ibsen, a Danish anaesthesiologist, became involved in the 1952 poliomyelitis epidemic in Copenhagen, where 2722 people became ill over a six-month period, with 316 of them suffering from respiratory or airway paralysis. Some of these patients had been treated with the few negative pressure ventilators that were available, but these devices (while helpful) were limited in number and did not protect the patient's lungs from secretion aspiration [5]. Ibsen changed the management directly by instituting long-term positive pressure ventilation via tracheal intubation, and he enlisted 200 medical students to manually pump oxygen and air into the patients. Carl-Gunnar Engström had created one of the first artificial positive-pressure volume-controlled ventilators, around this time which eventually replaced the medical students. With the change in care, mortality during the epidemic dropped from 90% to around 25%. Patients were cared for in three separate 35-bed areas, which aided in medication tracking and other management [6,7].

Florence Nightingale, an English nurse, pioneered efforts to use a separate hospital area for critically injured patients. During the Crimean War in the 1850s, she made it a habit to shift the sick patients to beds immediately across from the nursing station on each ward so that they could be regularly monitored. Walter Dandy, an American neurosurgeon, established a three-bed unit at Johns Hopkins Hospital in 1923. Specially trained nurses cared for critically ill postoperative neurosurgical patients in these units.

For a time in the early 1960s, it was unclear whether specialised intensive care units were required, so intensive care resources were brought to the patient's room who required the extra monitoring, care, and resources. However, it quickly became clear that a fixed location with intensive care resources and dedicated personnel provided better care than provision of intensive care services spread throughout a hospital. The first critical care residency in the United States was established in 1962 at the University of Pittsburgh.

Procedures and treatments

Intensive care typically treats patients on a system-by-system basis. The nine key systems considered in the intensive care setting are, in alphabetical order, the cardiovascular system, central nervous system, endocrine system, gastro-intestinal tract (and nutritional condition), hematology [8].

In the United States, physicians who have completed their primary residency training in internal medicine, pediatrics, anesthesiology, surgery, or emergency medicine must complete additional fellowship training in the

specialty. All five specialty boards in the United States offer board certification in critical care medicine [9]. Intensivists with a primary training in internal medicine may pursue combined fellowship training in another subspecialty such as pulmonary medicine, cardiology, infectious disease, or nephrology. The American Society of Critical Care Medicine is a well-established multi-professional society for ICU practitioners such as nurses, respiratory therapists, and physicians.

Critical care pharmacists collaborate with the medical team in a variety of ways, including monitoring serum medication concentrations, past medication use, current medication use, and medication allergies. Their typical round with the team, but this may vary depending on the institution. Following the completion of their doctorate or pharmacy degree, some pharmacists may pursue additional training in a postgraduate residency and become certified as critical care pharmacists. Pharmacists assist in the management of all aspects of drug therapy and may pursue additional critical care medicine credentialing as BCCCP by the Board of Pharmaceutical Specialties [10]. The multi-professional Society of Critical Care Medicine includes many critical care pharmacists. Inclusion of a pharmacist reduces adverse drug reactions and poor patient outcomes.

Respiratory therapists are frequently found in intensive care units, where they monitor a patient's breathing. Additional education and training in adult critical care and Neonatal and Pediatrics Specialties (NPS) are available to respiratory therapists [11,12]. These therapists have been trained to monitor a patient's breathing, provide breathing treatments, and assess for respiratory improvement.

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