



The development of neurologic intensive care

ALLAN H. ROPPER, MD

The primary drivers for the existence of a critical care unit have been (1) concentration of patients who require clinical surveillance that is more intensive than can be provided on a normal ward; (2) a need for efficient deployment of specially trained staff to provide this surveillance, along with the sophisticated technology that they manage; and (3) a need to apply solutions to disordered cerebral and systemic physiology.

Following this model, the progenitors of neurologic intensive care units (ICUs) grew from several streams of medical endeavor:

- The respiratory care units designed to service patients with polio following the development of mechanical ventilators by Ibsen in Copenhagen, and the evolution from these of Spalding and Crampton's respiratory ICUs at Radcliffe Infirmary
- The growth of cardiac care units following the demonstration by Killip in Indiana that provided a model for the application of a special technology (continuous ECG monitoring) and a focused treatment (lidocaine), and the modern medical-surgical ICU with special capability to monitor and treat wedge pressure
- Postoperative neurosurgical wards that promoted specific neurologic examination surveillance by special nurses and the application of intracranial pressure monitoring.

In all these circumstances, the ability to monitor and treat a physiologic change was the fulcrum on which special units were opened, and, just as importantly, the existence of these units was the basis for the establishment of a medical field.

From St. Elizabeth's Medical Center and Tufts University School of Medicine, Boston, Mass.

Address: Allan H. Ropper, MD, Department of Neurology, St. Elizabeth's Medical Center, Tufts University School of Medicine, 736 Cambridge Street, Boston, MA 02135; e-mail: aropper@cchcs.org.

■ EARLY FORCES THAT SHAPED THE FIELD

In addition to the training of neurologic nurses, the special physiologic measurement that truly created neurologic intensive care was the ability to measure intracranial pressure, beginning in the 1960s with the work of Lundberg. There was a presumption not only that intracranial pressure could be measured in humans but that it could be treated and that this would benefit patients.

Certain hospital social forces also contributed to the growth of the field, particularly the expansion of neurosurgical work that required postoperative beds for patients with trauma, brain tumors, aneurysmectomy, etc. It was only after momentum was created by neurosurgeons in large institutions that neurologists began to cull critically ill patients or patients with complex cases of status epilepticus and neuromuscular respiratory failure in the same or similar units.

This configuration set up a natural competitiveness in these units between neurosurgeons, neurologists, and the anesthesiologists who had been administering neuroanesthesia. Neurosurgeons soon lagged in involvement for a number of reasons, mainly because of their special surgical abilities, which offered a more sensible career path. Anesthesiologists, who initially took the lead in respiratory management and in cerebral physiology relating to blood flow and intracranial pressure, were largely displaced from critical care units by medical intensivists who had a wider range of skills, although their major limitation was (and continues to be) airway management.

■ MARKING MILESTONES

Certain milestones are worth noting. Large neurologic ICUs with an academic mission began opening in the late 1970s, including those at the Massachusetts General Hospital, Johns Hopkins, and Columbia-Presbyterian. Spinal cord units with a

focus on central nervous system sparing also appeared at this time, particularly in Miami. In 1978, David Jackson from Cleveland began giving an organized course in neurologic intensive care for the American Academy of Neurology. A textbook devoted to the subject appeared in 1983, and a number of pedagogic courses emerged afterwards. Board certification in critical care began in 1987 through the American Board of Internal Medicine and the American Board of Anesthesiology. An interest group arose at the American Academy of Neurology, but attempts at creating an identity through a subspecialty examination in neurology failed.

Through the 1980s, the number of neurologic ICUs proliferated greatly and fellows were trained, initially about four per year. Stroke units, often appended to a neurologic ICU, began to appear in the mid- to late 1980s. European units opened, notably in Heidelberg, and took the lead in critical stroke problems.

An intense period of investigation in brain sparing occurred in the 1990s but left little of value. Attempts at widening the use of electrophysiologic

measurements met with mixed success.

Among the many accomplishments of the field have been the development of postprocedure care of interventional neuroradiology, subarachnoid hemorrhage fluid management, treatment of status epilepticus, refinements of treatment for Guillain-Barré syndrome and myasthenia gravis, codification and study of brain death, and hemicraniectomy for stroke swelling. This year, a journal devoted to the field was initiated with Eelco Wijdicks as its editor.

■ CHALLENGES OF MATURITY

The field is now fairly mature. Neurointensivists have been successful at extracting aspects of practices from other specialties and incorporating them into a coherent specialty. However, there have been few fundamental changes since the early 1980s and almost no advancement of the neuroscience aspects of the field. The table of contents of a textbook from 1983 reflects the main themes presented in the current era. Looking back, it would appear that another novel physiologic measurement or treatment may be needed to stimulate the field.