EDITORIAL

MORE

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Recent events have shattered the complacency that had begun to surround critical care. It has become evident that the future will not resemble the past and that there will be an enormous upheaval in the way we will be caring for the critically ill during the next decade. Patient safety will become everyone's responsibility. Hand washing, sterile procedures by appropriately garbed individuals, redundant precautions regarding the use of medications, and a redefining of who is accountable are all inevitable. Hopefully, the analysis of adverse outcomes will define what needs changing in the system rather than establish blame for errors.

The retooling of intensive care units (ICUs) could provide a stumbling block as new technology displaces the old. Conventional monitoring will most likely lose the balloon-tipped, flow-directed pulmonary artery catheter. More relevant information will be derived from echocardiography when the resuscitation of a patient ceases to follow an expected pathway. As insulin usage increases, a continuous blood glucose-monitoring module may replace a pressure module in the monitor.

The scientific basis of what we do is changing fast. The rewards of molecular biology are entering the clinical arena through the related sciences of genomics (the study of the total genetic material of an organism) and proteonomics (the study of the genomic expression of proteins), with the switching on and off of physiologic responses. This will revolutionize resuscitation and the management of septic patients. The outcome of an episode of sepsis may depend on the patient's genome, and altering mechanisms for the expression of proteins will offer hope to those for whom further conventional therapy is deemed futile. There still will be patients to be cared for and loved, families who need to be supported, budgets to be balanced, and challenging staffing problems to be solved.

Specialization

There is a traditional *reductio ad absurdum* about our pursuit of expertise and specialization that eventually we will know more and more about less and less until eventually we will know absolutely everything about nothing. Are we approaching the miniscule when caring for critically ill patients and trying to prevent the excessive release of particles with a mere mass of 1.66×10^{-24} grams (1.66 yg*) apiece, namely protons or hydrogen ions, into the gastric lumen? This is far from nothing. What is the status of expertise in critical care?

Critical care has always been a horizontal specialty in a vertical world, an attribute shared to some degree by emergency medicine, family practice, and the newly emerging hospitalism. The cross-sectional nature of what we do is looked upon somewhat skeptically by more venerable and established specialties, as the intensivist commandeers a portion of everyone else's piece of the healthcare pie and may be responsible for how up to 50% of a hospital's budget is spent. In the United States, it has been relatively easy for nurses to both see the need for and implement the specialty of critical care nursing, but for physicians, this has not been the case.

A vested self-interest by the organizational powers of the various involved medical specialties has managed to produce anesthesiology critical care, surgical critical care, medical critical care, pulmonary medical critical care, and pediatric critical care (the only one with substantial justification). These should really be viewed differently, as anesthesiology, surgery, internal medicine, and pulmonary medicine are all partial subspecialties of critical care! In 1975, there was a closed meeting on the development of critical care board certification. One of the editors (CWB-B) suggested that the multidisciplinary nature of critical care made it a freestanding specialty. The suggestion was ruled as being politically untenable, because the

*yg = yoctogram = 0.000000000000000000000001 grams

American Board of Medical Specialties would not countenance the possibility of credentialing physicians in this new specialty, let alone the chairmen of the involved specialty boards. Even then, it was well recognized that no standing specialty covered critical care adequately.[1] We may all be witnessing a change.

The University of Pittsburgh and Dr Mitchell Fink deserve our earnest congratulations on the founding and development of the nation's first department of critical care medicine. Though now a well-established part of the institution, the department still poses a threat to the aspirations of some of the other departments that do not fully buy into the idea of critical care as a specialty. For 20 years, Australia and Spain have recognized the specialty, and it has thrived. Both countries have healthcare systems and policies that promote critical care specialization for both cost containment and better patient outcomes.

The body of critical care knowledge now includes a tremendous range of disciplines, from business management to the molecular. The practice is derived from a host of conventional specialties; unfortunately, critical care is being practiced at a suboptimal level in much of the community,[2] with part-time or poorly credentialed intensivist direction. Critical care now seems to be receiving support as a specialty because it is a multidisciplinary specialty. The breadth and depth of the knowledge base already outstrip that of any of the traditional vertical specialties. Surely, it is time to boldly turn this already *de facto* specialty into a fully operational one in the United States. Considering that the largest part of most hospitals' resources goes to the care of the critically ill, it seems prudent and logical that these resources be placed in the hands of a freestanding accountable department.

Patient Safety

When the Institute of Medicine published findings on medical error and patient mortality 3 years ago,[3] the purpose was to create a public awareness of how unnecessarily risky it was to be a patient. The estimate of up to 98 000 deaths a year attributable to error may well be an underestimate.[4] For instance, if the effect of inadequate nursing staff is taken into account,[5-7] the unidentified specifics of increased patient mortality need to be considered. Why is the incidence of patient mortality higher when there are not enough nurses to care for patients? The consequences of work overload and overtime are paid for at a terrifying cost. Not only are more nurses needed in ICUs, but it also has been shown that the presence of a high level of intensivist care may reduce mortality in the ICU by as much as 30%.[2]

Reducing error and increasing safety requires that all members of the patient care team be represented at regular meetings to develop guidelines and review data. A good example of this was recently given by Peter Pronovost of Johns Hopkins University School of Medicine. At the March 2003 Symposium on Managing Critical Care Systems in New York, Pronovost related how compliance with best practice for the insertion of central venous catheters made for such a high reduction in bloodstream infections that 7 lives and 500 ICU days were saved in 1 year at one ICU as a result.

This process evolved over several weeks, beginning with education of all staff regarding the need for the skin to be properly prepped; the sterile area to be draped; and the operator to be gloved, gowned, capped, and masked. As there was not a central place for all of the equipment, a cart with everything that was needed was assembled so that nothing had to be searched for before the procedure. Finally, a checklist was used to make sure that all of the safety precautions were being undertaken. There is nothing particularly difficult about developing and implementing such a protocol *if* everyone agrees to the need for the implementation and accepts responsibility in seeing that the implementation is carried out.

Strategies to enhance acceptance include creating a protocol that is user-friendly, eliminating old alternatives, and creating a system that rewards successful adaptation. Strategies need to be developed for ensuring that appropriate high-risk patients receive beta-blocking drugs before major surgery, that appropriate tidal volumes and inflation pressures are used when patients are being managed for acute respiratory distress syndrome, and that medication errors are reduced or abolished. The daily assessment of sedated patients and patients receiving mechanical ventilation[8] should be put into effect on a formal basis to reduce unnecessary ventilator days and ICU length of stay. Early therapy, managed by a critical care team that ensures patients outside the ICU are appropriately resuscitated as soon as anyone sees a deterioration in their condition (eg, hypotension, cardiac arrhythmias, or a sudden decrease in a patient's level of consciousness), has been shown to be effective at saving lives and reducing the need for ICU admission.[9] In some institutions, this has been designated a "code light." This approach is now greatly aided by the increasing number of Fundamental Critical Care Support-Course credentialed personnel in our hospitals.[10] Such teams can also function as a mechanism for instituting critical care during the hiatus in therapy that occurs all too often between acceptance by the critical care service and actual admission to the ICU.

More to Do

We now have a shrinking pool of critical care nursing staff to draw on (and this pool will shrink further, as many more of our colleagues are approaching retirement) and an inadequate supply of intensivists to meet the projected needs of an increasingly aged population, who will drive up the need for more critical care. Perhaps more physician manpower can be recruited from hospitalists. A frequent cry from these columns has been to reduce the workload of ICUs by separating out the high-dependency patients who have more predictable pathways and ascertainable outcomes. They are frequently subjects for a more protocolized and easier management. Following extensive major surgery, such as esophagectomy, pancreaticoduodenectomy, liver resection, coronary artery bypass, or a repair of an abdominal aortic aneurysm, many patients are suitably cared for in a monitored setting after a relatively short recovery period. This leaves the ICU open to provide more intensive care to individuals with organ failure and various shock syndromes who have a much more uncertain prognosis.

Even if care is provided at varying levels of intensity, there are a host of therapeutic maneuvers that still need to be applied to all, and some are labor intensive. A recent example is the use of "tight" blood glucose control (4.4-6.1 mmol/L [80-110 mg/dL]) within 24 hours of admission for a significantly improved outcome in the critical surgical ICU population.[11] Multivariate regression analyses strongly suggest that a decrease in mortality, critical illness neuropathy, bacteremia, and inflammation resulted from tight glucose control, whereas a reduction in renal failure was related to insulin dose. All of the patients were receiving nutritional support.

The rationale is not fully understood, but there seems to be an insensitivity to insulin in many stressed and shock patients. It may be that endogenous production is suppressed, that insulin binds to certain proteins and becomes inactive, or that receptor activity changes. The effect of a relative or real reduction of insulin activity may also have other effects, such as the control of the release of proinflammatory cytokines.

Imagine initiating a tight blood glucose control protocol for all critical patients in an ICU. It presents a logistical problem and an increased workload for the ICU staff. For the first 12 to 24 hours, blood glucose measurements need to be taken every 1 to 2 hours (probably with point-of-care testing by the nursing staff), and insulin infusions need to be adjusted. After stabilization, the frequency can be reduced to every 4 hours. Appropriate documentation in the patient's record follows each measurement. With the current 2:1 patient-to-nurse ratio in ICUs, a protocol such as this could use 5% to 10% of the allocated nursing care.

One of the biggest goals we must achieve is the collection of information. Without a comprehensive database, ICU experiences are anecdotal. Data on patient outcomes and resource utilization provide the best understanding of how critical care is faring in a unit, an institution, or even the world. Expertise in data analysis is yet another necessity of the critical care practitioner.

Conclusion

Acquiring a high level of proficiency in critical care is an extraordinary feat because of the sheer size and range of the task. If inadequately prepared, the specialist becomes a jack-of-all-trades. If adequately prepared, the specialist has mastery in all. Expertise in critical care demands knowing more and more about more and more!

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