

MY FIRST 50 YEARS OF CRITICAL CARE (1956-2006)

By Christopher W. Bryan-Brown, MD. From the Department of Anesthesiology, Albert Einstein College of Medicine, Bronx, NY.

After an unbelievably inspiring 18 years of coeditorship with Kathleen Dracup, first on *Heart & Lung* and then on the *American Journal of Critical Care (AJCC)*, which we launched together in July 1992, I have retired, leaving the medical coeditorship in the capable hands of Dr Peter Morris—a more than worthy successor. As a farewell to the editorship of *AJCC* (now in its 16th year of publication!), I have been asked to write an overview from my personal perspective of critical care.

My perspective is half a century long, so I have plagiarized my editorial title after a book by one of my senior and beloved role models: Dr Alec Cooke's *My First 75 Years of Medicine*.¹ To celebrate Dr Cooke's 90th birthday, his children gave him his first computer, with which he wrote his memoirs. He was renowned for statements that contained the humor of Yogi Berra and the wisdom of Socrates. One of Cooke's Laws that has guided my practice as a physician is this: "Doctors do not treat diseases; they treat patients."

A half-century overview would be too long and tedious to insert into *AJCC*, so I am choosing to cover a few closely related topics that by chance may be of universal interest; issues that I have tried to promote, with varying degrees of success, in these pages and in my life. These musings are frequently anecdotal and personal.

Critical Care: The Early Years

My first experience of critical care was in 1956, when I volunteered as a locum (temporary) medical

student intern in the respiratory unit of the Churchill Hospital in Oxford, England. Multidisciplinary critical care had been in existence only for about 3 to 4 years, and had been started by Bjørn Ibsen,^{2,3} who was in charge of a hospital in Copenhagen given over to the management of a particularly virulent strain of poliomyelitis that gave rise to a pandemic in the early 1950s. (This pandemic was cut short in the United States by the introduction of the Salk vaccine.) The unit was started by the chief of neurology and run by Dr Spalding (a neurologist) and Dr Crampton Smith (later Nuffield Professor of Anaesthetics). They encouraged research into respiratory care, and later produced the first comprehensive, science-based "how-to" book: *Clinical Practice and Physiology of Artificial Respiration*.⁴

The change from the use of iron lungs, which were expensive and cumbersome, to prolonged positive pressure ventilation through a cuffed endotracheal or tracheostomy tube was an essential factor in the development of critical care. Positive pressure ventilation allowed easy access to the patient for nursing and medical procedures. Most of the patients were relatively long term and presented with poliomyelitis or tetanus. Assiduous attention was paid to hand washing, nutrition, pulmonary toilet, skin integrity, and psychological stress.

Patient Comfort

By its very nature, an intensive care unit (ICU) is not a comfortable place. There is generally too much noise, bright light, bustling activity, and physical disturbance in the environment. Pain and fear are ever-present for patients, and such challenges require constant attention. Resources often seem less than needs.

To purchase reprints, contact The InnoVision Group, 101 Columbia, Aliso Viejo, CA 92656. Phone, (800) 809-2273 or (949) 362-2050 (ext 532); fax, (949) 362-2049; e-mail, reprints@aacn.org.

When critical care became established, which probably happened nearly a decade earlier in Europe than in the United States, one of the immediate concerns was for the physical and mental comfort of the patients. Tetanus was the first condition for which sedation was used as part of the treatment. The best standard of care quickly became paralysis (initially with curare and later with pancuronium) and mechanical ventilation. The use of nitrous oxide seemed an obvious choice to the anesthesiologists, who comprised the majority of intensivists in the early days. The gas was easily obtained, respirable, analgesic, and would readily sedate the patient.

Unfortunately, as Lassen (a colleague of Bjørn Ibsen's) and colleagues reported in 1956, prolonged use of nitrous oxide could cause bone marrow suppression, and even fatal aplastic anemia.⁵ Its use continued in tetanus patients for another decade,⁶ however, and was overtaken by halothane anesthesia, which seemed to suppress the sympathetic overactivity of severe tetanus (the "horrors"). Halothane was sometimes administered for up to 3 weeks.^{7,8} The treatment of tetanus patients with muscle relaxants disquietingly led some anesthesiologists to ponder rather too publicly whether pancuronium might have amnesic properties! Fortunately, there are too many accounts of how unpleasant it is to be paralyzed, awake, and aware to belie this suggestion. Even if the condition is not remembered, it still must be extremely unpleasant.

Dealing With Stress

One of the fathers of modern critical care, Martin Holmdahl, developed a system with the aid of his head nurse in Uppsala, Sweden, whereby no patient requiring ventilator support was ever left without knowing that a person was present. Medical students, housewives whose children had flown the nest, and others were hired for a modest fee to be with ventilated patients so they would not feel alone.⁹ These aides also were helpful when patients needed suctioning, bathing, or their beds made. Years later, in 1971, the late Peter Safar and Åke Grenvik (a protégé of Martin Holmdahl) wrote, "Every patient maintained on mechanical ventilation, even when stabilized, needs a well educated person at the bedside at all times: he or she might be a medical or nursing student, a respiratory therapist, even a non-professional but well trained individual."¹⁰ John Ablett, in Leeds, England, enlisted family members to be with paralyzed children with tetanus and to keep their presence known by reading to their youngsters.

Over the years I have noticed that patients who recalled being paralyzed and ventilated consistently found the most terrifying part of the experience to be any time they did not know if anyone was at the bedside

with them. This is one of the more telling reasons for having open visiting policies: to prevent the agonizing loneliness of being helpless and feeling that there is no one there to observe and care. In an interesting comparison between equivalent ICUs in the United States and Norway, Martin and Mathisen¹¹ found that restraints, heavy sedation, and inadvertent tracheal extubation were fairly common events in the United States, whereas restraint and inadvertent tracheal extubation were rare in Norway and sedative medication was used far less often. It's worth noting, however, that the patient-to-nurse ratio was significantly lower in the Norwegian ICU in this study.

The stresses of critical care units and disease were recognized early on as a cause for depression, disorientation, hallucinations, and self-destructive manic behavior; these issues were first formally studied around the beginning of the 1970s. In the United States this research was done mainly in coronary and cardiac surgical units, the largest portion of the ICUs.¹²⁻¹⁴ The investigators were able to show the baneful effects of the ICU environment on the psyche of the suffering, sleep-deprived patient, but initially did not appreciate that denial could be a very helpful coping mechanism—the antithesis of Freudian dogma! Noise was very difficult to control. Coronary care units were often carpeted, but this was not suitable for the surgical units, which had to contend with the spillage of noxious and unsavory fluids onto the floor and the sepsis that could result.

One of my coworkers, a psychologist, was studying the galvanic (electrical) skin resistance of the sole of the foot to measure anxiety. We never collected enough data to publish, but we did find that the sound of the conventional telephone ringing could produce the fast polyphasic change associated with increased sympathetic activity. (This is one of the measurements of the polygraphic lie detector.) Although conventional telephone bells had been removed in some ICUs, replaced with soft flashing lights, there was administrative concern that the telephone would become too easily ignored by the unit staff. We had more success introducing a quiet hour in the middle of the day, and surprisingly found that not only did it cut down telephone usage, but also became quite accepted by the medical staff, who would arrange to see their patients at other times. It also enabled a decent lunch break for the ICU staff most days.

We have now removed much of the stress from mechanically ventilated acutely ill patients by sedating them so heavily (a standard of care) that they must be awakened every day to see how they are (another standard of care!).^{15,16} Most of the drugs we use—with the possible exception of dexmedetomidine—do not produce

normal sleep patterns, and may not leave the patient feeling rested after prolonged use. Heavy sedation cuts down on the workload of the nursing staff, of course, but it is difficult to accept this as a rationale for its use, even with the obvious shortage of critical care nurses.

Further Study

There are several questions that need answering, hopefully early on in the next half century. Is pharmacological sedation harmful to survival, for example? Does it cause significant problems with immune competence, apoptosis, mental stress disorders, cognitive dysfunction in the elderly, or diminished cardiovascular function? How much does it increase the ICU length of stay? Certainly we must try harder to make the environment more comfortable and aim for less heavy sedation, perhaps through added human presence or some new medicinal approach. Just because patients have amnesia does not mean they did not suffer both physically and mentally. The amnesia of the critically ill patient may protect us too!

Another area that needs more refinement is the assessment of physical pain. The current 1 through 10, no pain/worst pain scale is too often treated as linear, which it is not. Pain is a subjective phenomenon (“pain is when the patient says it hurts”), so a more realistic subjective assessment is needed rather than a number that satisfies inspecting agencies. Operationally the treatment of pain is a good guide. Comfort measures, mild analgesics, strong analgesics, and strong analgesics *stat* would describe the basic levels we live by.

Staff Comfort

The stress of critical care also has been tough on the ICU staff, and more than 30 years ago Ned Cassem was at the forefront helping with the problems leading to burnout and turnover.¹⁷ Strong, sympathetic, collaborative, and present leadership; time to decompress and ventilate; and not having to provide the full armamentarium of critical care to patients with obviously terminal prognoses all are stress-reducing factors. When a dying patient is expected to receive needless treatment, it is difficult for the entire ICU team, but nurses must live with the decision at the bedside. Moral distress is hard to deal with, but it is frequently a product of hospital policy or codes. This unfortunate circumstance was neatly summed up by Andrew Jameton as arising “when one knows the right thing to do, but institutional constraints make it nearly impossible to pursue the right course of action.”¹⁸

To address the problem of caring for the dying in the ICU, in 1973 my colleagues Diane Adler, Will Shoemaker, Garth Tagge (a visiting senior fellow),

and I developed a 4-tier system, with a “1” for patients who should receive the full power of critical care, a “2” signifying patients whose proper treatment should be discussed, a “3” with patients for whom the subject of proper treatment should be discussed on rounds (twice daily), and “4” being the equivalent of our current “do not resuscitate,” or DNR. The number was recorded on the patient’s worksheet (not part of the permanent record) in the upper left-hand corner. In this system the vast majority of patients were a “1,” very few were a “4,” and the psychological stress of caring for dying patients was reduced.¹⁹

The prognosis was discussed with family members, but they were not cornered into having to give their signed permission and their wishes were always respected. All was going well until a description of our system appeared in *Medical Economics*. Administrators were ready to terminate our contracts of employment because of the possible loss of institutional prestige that would occur if it was known that we let patients die in the ICU. Fortunately our dean saw things differently. The Harvard ethical criteria for dealing with terminally ill patients had just been promulgated, so what we had been doing amounted to another “first” for our institution. After that, it became necessary to record our dire prognoses in the record, and patients’ relatives had to give formal consent.

Familiarity Breeds Collaboration

“Collaborative practice” has become a catchphrase, but it means different things to different people. After all, when physicians and nurses are working together, physicians feel there is a collaborative relationship much more often than the nurses do.²⁰ In the early 1970s I felt that if physicians and nurses were on a same-name basis it might increase respect for the nurses. Nurses were usually addressed by their first names, and physicians as “Doctor X.” I asked the director of nursing if she would object if nurses so addressed by physicians in turn addressed physicians by their first name. Her answer was simply “try it!” Department chairs found it strange, but all (some reluctantly, I’ll admit) went along with it. (In 50 years I have never been accused of political correctness!) I have mixed feelings about the development of doctoral degrees in nursing practice as a measure that will increase respect. In my book, familiarity breeds collaboration.

When I presided over the Society of Critical Care Medicine, I put forward the following resolution at the annual general meeting: “This Society will not join an international critical care organization that does not allow national critical care nursing organizations to join as full and voting members.” The resolution was passed

nem con (no one contradicting), and I went off to Mexico to draw up the bylaws and agreements founding the World Federation of Societies of Intensive and Critical Care Medicine (WFSICCM). I was accused of blackmail and worse, but the fledgling organization accepted nursing organizations as members rather than lose the United States. I then received my most treasured recognition when, in 1979, I was the second physician to be elected to honorary membership in AACN. Critical care nursing now has received much more recognition and respect worldwide, and I admit to a pang of sadness when a separate international nursing organization was set up at the 2001 WFSICCM Congress in Sydney.

Reducing Patient-to-Nurse Ratios

The current enthusiasm in the United States for staffing ICUs is to have a patient-to-nurse ratio of 2 to 1. More than that is considered an excessive workload and dangerous for patient care. Whenever I suggest that this number is far too high and propose a 1-to-1 ratio, I see administrators (who despite what I've written here I regard as allies) become wide-eyed and develop circumoral pallor. As a nation we have far too many ICU beds—about 8% to 12%, or 55 000 beds in 6000 ICUs. This overbedding is the result of service promotion in our unfortunate marketplace business model of healthcare management. Most other countries with advanced medical systems run with 3% to 4%. The disturbing result is that both systems cry out for more ICU beds and are de facto rationing critical care.²¹ Generally the systems abroad have much lower ICU patient-to-nurse ratios and a heavy reliance on step-down, high dependency, or progressive care units. They often have 3 times the number of step-down beds as ICU beds, a step-down patient-to-nurse ratio of 3 to 1, and all beds controlled by the same critical care service.

We are currently providing for critically ill, unstable patients by pairing them with patients for whom we have little to offer, either because they are sufficiently improved or need more palliative than critical care. If the high acuity patients number more than 50% of the ICU census, we have a problem. Would we be better off with half the number of ICU beds and adequate and available step-down facilities? Peter Safar²² warned us in the 1960s that between a 90% to 95% patient census and keeping an ICU full can render it unavailable for the next patient in need.

Perhaps in our current model an empty bed must be regarded as a missed billing opportunity, but it does lead to an impression of the need for more. One-to-one critical care patient-to-nurse ratios have been shown to be associated with less sepsis²³ and markedly improved major surgical outcome^{24,25} and job satisfaction. With

this change, ICU length of stay ought to be measured in hours, not days. The big push will be to stop the admission of patients who will not benefit from critical care and to discharge those who no longer need it.

Family Comfort

The publication that has had the most influence on critical care nursing is undoubtedly the paper on the needs of relatives by Nancy Molter²⁶ published in 1979. Many have tried to emulate the study in various ICUs and under various conditions, but have come up with the same message: communication. The relatives of the critically ill are comforted by information from those caring for their loved ones. They want to talk things over with the nurses *and* doctors doing the caring. They need to be reassured that the best possible care is being offered to the patient.

For some of my career I was fortunate enough to have a large office adjacent to the ICU. Whenever I was there the door was open, and any relative was welcome to come and talk. Callers were few, but knowing that the ICU director was available seemed to be reassuring in itself. Open visiting was harder to introduce, but once established the staff would not have had it any other way. Although we asked visitors to leave if cardiopulmonary resuscitation was started, they were not asked to leave during rounds, and even participated and were encouraged to ask questions about what was being discussed. They also provided a more human value to the patient. Unfortunately, this type of behavior would probably be considered noncompliant under the current interpretation of Health Insurance Portability and Accountability Act regulations!

Families are now beset with ever-greater responsibility and decision making when their loved one is not doing well. Palliative care, social services, and ethicists are there to help the ICU team and family members more than ever before. To paraphrase David Crippen (from a list published in the now defunct *Intensive Care World* in 1992), the difficulties with family decision making may be due to a lack of intellectual or emotional capacity, the doctor being blamed for the patient's condition, anecdotal tales of "miracle" cures, lack of financial incentive to withdraw treatment, "getting at" society from a one-down position, and conflict of interest (eg, inheritance). This last factor becomes increasingly significant as the children of elderly debilitated patients see their parents' nest eggs disappear as they pay for care that seemingly offers the elderly patient little benefit.

The right of self-determination is now strongly ingrained in our culture, but not everyone wants to make decisions. In the late 1970s Franz Ingelfinger, a former editor of the *New England Journal of Medicine*,

was diagnosed with carcinoma of the esophagus. He was receiving such a variety of advice that he could not clearly make up his mind what to do. A friend told him that what he really needed was a doctor! He found comfort in having someone he knew and trusted to make decisions for him. He wrote about this experience in a posthumously published article titled "Arrogance."²⁷

Closing Thoughts

We can never be certain that what we are doing overall is best for our patients.²⁸ The problem with evidence-based care is that unless what we are doing is 100% successful, we should be creating new evidence and testing it. In an era when pay for performance is being lauded as cost saving, I would hate to see such a thing stifle innovation. Even the Surviving Sepsis Campaign²⁹ is meagerly endowed with evidence, and will undoubtedly be different next year. This is precisely why I have chosen to write about the ICU and the people in it over the last 50 years as opposed to technological advances that will most likely change in the near future anyway.

I shall miss the warm support and professionalism of Kathy Dracup as I retire to the honorary position of *AJCC* "founding editor," but I will continue to enjoy my membership in and continue to support my favorite organization: the American Association of Critical-Care Nurses. From my perspective, the next 50 years in critical care look as though they will be quite exciting indeed.

The statements and opinions contained in this editorial are solely those of the Editor.

FINANCIAL DISCLOSURES

None reported.

REFERENCES

1. Cooke AM. *My First 75 Years of Medicine*. London, England: Royal College of Physicians of London; 1994.
2. Ibsen B. The anaesthetist's viewpoint in the treatment of respiratory complications in poliomyelitis during the epidemic in Copenhagen, 1952. *Proc R Soc Med*. 1954;47:72-74.
3. Ibsen B. From anaesthesia to anaesthesiology: personal experiences in Copenhagen during the past 25 years. *Acta Anaesthesiol Scand Suppl*. 1975;61:1-69.
4. Spalding JMK, Crampton Smith A. *Clinical Practice and Physiology of Artificial Respiration*. Oxford, England: Blackwell Scientific Publications; 1963.
5. Lassen H, Henriksen E, Neukirch F, Kristensen H. Treatment of tetanus: severe bone-marrow depression after prolonged nitrous-oxide anaesthesia. *Lancet*. 1956;270:527-530.
6. Bodman RI, Morton HJ, Thomas ET. Treatment of tetanus with chlorpromazine and nitrous-oxide anaesthesia. *Lancet*. 1955;269(6883):230-231.
7. Kerr J, Corbett J, Prys-Roberts C, Smith A, Spalding J. Involvement of the sympathetic nervous system in tetanus: studies on 82 cases. *Lancet*. 1968;2:236-241.
8. Prys-Roberts C, Corbett JL, Kerr JH, Smith AC, Spalding JM. Treatment of sympathetic overactivity in tetanus. *Lancet*. 1969;1(7594):542-545.
9. Holmdahl MH. Respiratory intensive care unit. *Anesthesiology*. 1963; 23:559-568.
10. Safar P, Grenvik Å. Multidisciplinary intensive care. *Mod Med*. 1971; 39:92-99.
11. Martin B, Mathisen L. Use of physical restraints in adult critical care: a bicultural study. *Am J Crit Care*. 2005;14:133-142.
12. Hackett T, Cassem N, Wishnie H. The coronary-care unit: an appraisal of

- its psychologic hazards. *N Engl J Med*. 1968;279:1365-1370.
13. Kornfeld D. Psychiatric problems of an intensive care unit. *Med Clin North Am*. 1971;55:1353-1363.
14. Cassem N, Hackett T. Psychological rehabilitation of myocardial infarction patients in the acute phase. *Heart Lung*. 1973;2:382-388.
15. Kress J, Pohlman A, O'Connor F, Hall J. Daily interruption of sedative infusions in critically ill patients undergoing mechanical ventilation. *N Engl J Med*. 2000;342:1471-1477.
16. Heffner J. Wake up call in the intensive care unit. *N Engl J Med*. 2000;342:1521-1522.
17. Cassem N, Hackett T. Stress on the nurse and therapist in the intensive-care unit and the coronary-care unit. *Heart Lung*. 1975;4:252-259.
18. Jameton A. *Nursing Practice: The Ethical Issues*. Englewood Cliffs, NJ: Prentice Hall; 1984.
19. Tagge G, Adler D, Bryan-Brown C, Shoemaker W. Relationship of therapy to prognosis in critically ill patients. *Crit Care Med*. 1974;2:61-63.
20. Thomas EJ, Sexton JB, Helmreich RL. Discrepant attitudes about teamwork among critical care nurses and physicians. *Crit Care Med*. 2003;31(3):956-959.
21. Sinuff T, Kahn moui K, Cook D, Luce J, Levy M. Rationing critical care beds: a systematic review. *Crit Care Med*. 2004;32:1588-1597.
22. Safar P. Intensive care unit organization. In: Safar P, ed. *Respiratory Therapy*. Philadelphia, Pa: FA Davis; 1965:362-373.
23. Vincent JL, Bihari DJ, Suter PM, et al. The prevalence of nosocomial infection in intensive care units in Europe: results of the European Prevalence of Infection in Intensive Care (EPIC) study. *JAMA*. 1995;274:639-644.
24. Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K. Nurse-staffing levels and the quality of care in hospitals. *N Engl J Med*. 2002; 346:1715-1722.
25. Pronovost PJ, Rinke ML, Emery K, Dennison C, Blackledge C, Berenholtz SM. Interventions to reduce mortality among patients treated in intensive care units. *J Crit Care*. 2004;19(3):158-164.
26. Molter NC. Needs of relatives of critically ill patients: a descriptive study. *Heart Lung*. 1979;8:332-339.
27. Ingelfinger FJ. Arrogance. *N Engl J Med*. 1980;303:1507-1510.
28. Carey J. Medical guesswork: from heart surgery to prostate care, the health industry knows little about which common treatments really work. *Business Week*. May 29, 2006:72-79.
29. Dellinger RP, Carlet JM, Masur H, et al. Surviving Sepsis Campaign guidelines for management of severe sepsis and septic shock. *Crit Care Med*. 2004;32:858-873.