

assertion that the baseline incidence of barotrauma of less than 1 per cent helps to establish the safety of volume-cycled ventilators. Only pressure-cycled and volume-cycled ventilators were used; yet the one ventilator mentioned by name was the Engström, which is time-cycled (as are the Emerson, Siemens Servo 900-B, Foregger, and others commonly assumed to be "volume" ventilators). This is not semantic quibbling. The operational characteristics of most time-cycled ventilators, particularly with respect to the delivery of gas flow and pressures, are different from those of most volume-cycled ventilators. Theoretical considerations suggest that barotrauma might be less when time-cycled ventilators are used because the inspiratory flow pattern can be more precisely controlled. If the authors were indeed using time rather than volume-cycled ventilators, the information is of great importance.

This last point ties in with what is most important in this study. What were the circumstances that led to the decrease in observed barotrauma? Their suggestion that the present study included fewer patients with chronic obstructive pulmonary disease than that reported previously from their institution may partially explain those differences. However, their overall patient population does not appear significantly different from those in other surgical intensive care units. This is most disturbing, for it suggests the

authors are doing something right and the rest of us are doing something wrong, yet none of us can ascertain what the differences are. Perhaps the greatest value of this study will be to provoke all of us to a re-assessment of our therapy. An overall incidence of pulmonary barotrauma of 0.5 per cent is a worthy goal indeed. Whether we can attain it either individually or collectively with prospective, cooperative multicenter studies remains to be seen.

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## *Are Anesthesiologists Experts in Cardiopulmonary Resuscitation?*

FIVE YEARS AGO, at the American Society of Anesthesiologists (ASA) Annual Meeting, the late Dr. Thomas K. Burnap organized a workshop session where ASA physician members could be tested in their skills and didactic knowledge of cardiopulmonary resuscitation (CPR). Instructors were asked to

pass those physicians whom they believed could adequately sustain life using CPR techniques. Although the data from that testing workshop were never published, it showed that only about 20 per cent of those (admittedly self-selected) participants were able adequately to resuscitate a manikin on first testing.

In this issue, Schwartz, Orkin and Ellison present the findings of a test of knowledge of currently accepted CPR sequences in a group of practicing anesthesiologists.<sup>1</sup> Their predictable conclusion that

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the majority failed the didactic test correlates well with the performance scores at the ASA meeting. Further support of the contention that anesthesiologists in general tend not to be well trained in current CPR practices comes from our own experiences and those of the University of Pennsylvania in testing anesthesia faculty members. Initial testing (before remedial training) invariably shows deficiencies in both didactic knowledge and performance of currently accepted CPR practices. This is a little surprising in view of the fact that anesthesiologists tend to be thought of as experts in this field. In fact, individual anesthesiologists have been the leaders in research into CPR.<sup>2</sup> However, the specialty as a whole fails to meet this expectation.

Why is this so? It may be that since most anesthesiologists feel they know and can do CPR well, they tend not to stay current. Also, many anesthesiologists have never been exposed to a formal CPR certification course. After all, if one is already supposed to be an expert, why study the subject further? Perhaps, now that this fallacy is being exposed, anesthesiologists will have an incentive to test their skills and improve them.

How can one do this? Two agencies are active in teaching CPR in the United States. The American Heart Association (AHA) and the American National Red Cross both pattern their teaching materials after recommendations promulgated by the National Conference on Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care. Courses are available through both organizations leading to certification in Basic CPR or Basic Cardiac Life Support (BCLS). An important distinction must be made between *review* courses in CPR not requiring testing and true *certification* courses, which do require objective didactic and performance testing. In our experience, only the latter tend to be truly effective in improving performance.

If you are still a skeptic, subject yourself and your colleagues to an objective test on a recording Resuscianne<sup>®</sup> manikin under the guidance of a certified CPR instructor. The results may surprise you. Many physicians fail to see the need for CPR training until faced with a strip chart that documents their inadequate performance. Can one say that practicing CPR on a manikin improves the performance of CPR on a patient? Although no research bears directly on this problem, the answer is probably "yes" for the following reasons. It is obvious that the psychomotor skills required for proper CPR should not be practiced *de novo* on a human being. Currently available

manikins are constructed so that airway, ventilation, and compression characteristics provide realistic responses.<sup>3</sup> To take a single example, it has been recently shown in man that the effectiveness of cardiac compression, as measured by blood flow in large arteries and arterial blood pressure values, can be significantly improved by the prolongation of compression time to 60 per cent of the full compression-relaxation cycle.<sup>4</sup> The avoidance of "quick-jabbing" compressions and learning the use of a distinct pause during compression are difficult, with supervised manikin practice being the only feasible training method. Only practice on a manikin will enable one to break bad habits and master new variations of CPR which have direct, proven clinical applicability. In a recent paper, McIntyre *et al.* have shown how improper CPR technique performed on a recording manikin correlates with pathophysiologic syndromes seen in man during CPR.<sup>5</sup> They point out how insistence on rigid standards for performance in CPR can maximize chances for survival and minimize complications. An analogy is the airline pilot perfecting and testing skills in a simulation trainer instead of an actual aircraft.

Requirements for certification<sup>6</sup> include passing a written and performance test on one- and two-person CPR, infant CPR and obstructed airway techniques. After completing the initial course, one can advance "up the ranks" via other courses to instructor, instructor-trainer, and faculty certifications. There is a great need for certified physician instructors to lead and advise organizations who are teaching basic CPR to lay and paramedical groups. Those of us who participate in such activities find them to be professionally rewarding in terms of immediate public benefit.

After having achieved BCLS (Basic CPR) certification, the next step is certification in the AHA Advanced Cardiac Life Support (ACLS) program. ACLS is a comprehensive curriculum<sup>7,8</sup> that includes such topics as adjuncts for ventilation and circulation, arrhythmia recognition, defibrillation, intravenous techniques, use of drugs, correction of acid-base abnormalities, and stabilization and transportation. It is taught only to paramedical, nursing and medical groups. The ultimate goal is to make the curriculum available in every medical school. In order to do this, however, a large dedicated cadre of physician ACLS instructors must be established.

One might also ask why CPR certification (and periodic recertification) is not already a requirement for certification by the American Boards, state medical licensure, or hospital medical staff member-

ship. At the least, I would encourage departments or groups of anesthesiologists to provide BCLS (or even ACLS) certification for their members. It is hoped that anesthesiologists, with their unique skills, will continue to take the lead in teaching basic and advanced cardiac life support.

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