causes no clinically evident impedance to venous return; (3) there is no clinically significant clot formation on the device, nor is there evidence of embolic phenomena; (4) the device does permit carbon dioxide and oxygen transfer to a limited degree; and (5) the technique does not require additional intensive care personnel to properly care for the patient.

There are, however, two factors that limit acceptance of this prototype as an early option in the patient’s clinical course: (1) systemic anticoagulation is required during device implantation, and (2) implantation necessitates a surgical procedure. Unfortunately, when implanted in patients who are already requiring high airway pressures and high oxygen concentrations, the present gas exchange capabilities do not appear sufficient to have a major clinical impact.

An international, multicenter study of IVOX is in progress. Debate on the efficacy and potential clinical impact of this generation of IVOX devices must await the results of this trial. However, the success of this device in selected patients is testimony to the clinical feasibility of the concept and the technology. The use of intracorporeal respiratory support devices should be continued and encouraged in selected medical centers to permit identification of patient populations that may benefit from the current technology and to facilitate clinical testing of new generations of devices. It is hoped that eventually a device can be developed that will permit clinically meaningful gas exchange, that can be placed percutaneously, that will not require anticoagulation, and that may lead to extrapulmonary respiratory support becoming an early and routine supplement to airway pressure therapy.

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REFERENCES

5. Cane RD, Shapiro BA. Mechanical ventilatory support. JAMA 1985; 254:87-92
17. Tomassian IM, Snedecor SM, Cornell RD. National experience with extracorporeal oxygenation (ECMO) for newborn respiratory failure: data from 715 cases. Ann Arbor, Mich: ECMO data Registry, Department of Surgery and Biostatistics, University of Michigan, 1986

The Burgeoning Field of Respiratory Care Captured in a Single Volume!

A Historical Perspective and Comment on a Magnificent New Book

The roots of the field of respiratory care can be found in the earliest recordings of history. That air
was necessary for life was first revealed in the biblical story of Elisha, who restored to life the son of a Shunammite woman by breathing into the mouth of the child. In 300 BC, Aristotle conducted the first recorded experiments in respiratory physiology. He observed the suffocation of animals kept in tight cages and their terminal panting for breath, but he concluded that death was a result of the animals' inability to cool themselves. Many citations on the renaissance in the physiology of respiration are possible and as a minimum must include the discovery of oxygen by Priestley (1775) and Lavoisier's discovery that oxygen is absorbed through the lungs and carbon dioxide and water, along with the inert gas nitrogen, are given off during expiration. Thomas Beddows established a research institute in Bristol, England, for the purpose of inhalational treatments of oxygen for heart disease and asthma in 1800.

Explorers of the earth's atmosphere recorded visual disturbances, paralysis of the legs, unconsciousness in balloon ascents, culminating in death above 29,000 ft, which led to experiments with both hypobaric and hyperbaric oxygen in the late 1800s and the early 1900s.

A systematic study of the effects of altitude was carefully recorded by J. S. Haldane in 1919. In his description of observations made atop Pike's Peak, Colorado, Dr. Haldane wrote that "partial anoxia means not a mere slowing down of life, but progressive and perhaps irreparable damage to living structure." Haldane predicted that oxygen would be useful as a therapeutic agent in states of hypoxemia.

Barach was quick to pick up on Haldane's advice and was himself a pioneer in the study of oxygen in clinical medicine. Barach first championed the use of an oxygen test for the administration of oxygen in lobar pneumonia, among other contributions.

Barach also reported his observations on the therapeutic use of carbon dioxide, oxygen-carbon dioxide mixtures, helium, positive-pressure breathing, and inhaled epinephrine and phenylephrine for bronchodilation. Barach summarized his extensive experience with respiratory care techniques and those of his contemporaries in his landmark volume on the field then termed "inhalation therapy" in 1944. The book was written solely by Dr. Barach. As in the many texts that have accompanied the more recent and dramatic advances in the field now termed "respiratory care," Barach organized his book on physiologic principles and a clear description of the techniques of inhalational therapy. He cited the New York Academy of Medicine statement: "The importance of inhalational therapy in modern medical practice is shown by its use in cardiac failure, coronary artery disease, postoperative atelectasis of the lungs of the newborn, pneumonia, pulmonary edema, emphysema and cerebral thrombosis. A proper understanding of the technique of application is especially necessary at this time because of its value in the treatment of war gas poisoning, severe hemorrhage, acute altitude sickness and shock." Thus, as with many advances in medical care, war was a major stimulus for the development of new concepts and technologies in respiratory care. Barach's work stands alone as a monument to all who contributed to the knowledge of his pioneering era. His was a single-author book. Barach continued to make important contributions to the field until his death in 1977.

The "modern era" can be defined by any significant advance or arbitrarily by any date or even a decade. The 1960s saw more anesthesiologists, pulmonary physiologists, and pulmonologists work together in the growing field, now called respiratory therapy. Peter Safar's books had 18 contributors, most notably William F. Miller of Dallas and Reuben Cherniack, then of Winnipeg, who, along with the other leaders of the era, produced a mighty monograph in 1963, the year of the beginning of our respiratory care unit at the University of Colorado.

Safar assumed that his readers knew some basic respiratory physiology. Safar wrote of replacing the "cookbook approach with patient titrated treatment," based on sound physiologic and pharmacologic principles. This approach, he hoped, would contribute most to closing the existing gap between scientific knowledge and its clinical application.

The Denver group offered a summary of their contributions to the field in three editions beginning in 1971. Ours was the era of the characterization of the acute respiratory distress syndrome and the rediscovery of positive end-expiratory pressure in its applications. This was also the era of the study of pulmonary rehabilitation and the establishment of newer treatment methods, including ambulatory oxygen therapy. But our group of ten contributors to each of the three issues could not capture all that was going on in respiratory care throughout this country and elsewhere in the world in a single volume.

Donald Egan's Fundamentals of Respiratory Care, a massive book, was the first of the expanded texts in respiratory care and is now in its fifth edition, having been preceded by editions published in 1969, 1973, 1977, and 1982. Each edition covered the extremely exciting period of expanded growth in knowledge and technology in the field of respiratory care. The leaders of respiratory care can be justly proud of all of those advances, which have served and saved millions of people throughout the world. Egan's first four editions emphasized "theories and principles as the basis for intelligent and safe practice." The continued emphasis on the growing importance of disciplined scientific inquiry as a basis for determining the efficacy of our clinical interventions... represents one of the most
visible components in the ongoing professionalization of the field.9 Egans fifth edition,9 now edited by Scanlan, Spearman, and Shelden, includes chapters by 23 contributors and 850 illustrations.

An equally valuable major text originally edited by Burton, Hodgkin, and Gee is now in its third edition.10 It was first published in 1977, with a second edition in 1984. The third edition contains chapters by 61 contributors. I agree with the editors predictions that respiratory care will become increasingly therapist driven and that the need for RCPs [respiratory care practitioners] in the outpatient setting will become increasingly more obvious. Comprehensively trained, flexible, and innovative RCPs will do well in the new environment.

Now, in my opinion, comes the masterpiece. David Pierson, an original product of the Colorado influence, and another friend, Bob Kacmarek, both of whom have contributed an enormous amount of art, knowledge, and science to the field, have produced a most comprehensive and beautifully illustrated volume, which will delight all who work in the field, Fundamentals of Respiratory Care.11 A product of one of the longest literary gestational periods I am aware of, the book is complete and current in every respect. Aided by 54 contributors, the editors have produced an integrated text. It is not intended to be either a doctor book or a therapist book; to quote them, it is, a comprehensive resource for other health professionals who participate in the assessment and management of patients with disorders affecting the respiratory system.

Although no one book can be all things to all people and answer every question, this one comes very close. Remember that new questions and their answers always provoke more questions! Accordingly, the student or practitioner of respiratory care will never rely entirely on any one text for guidance. As new developments occur and are reported in the literature, additions and revisions of any book are required. But for now, all of us who are involved in this fascinating field have a new benchmark!

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REFERENCES
1 Barach AL. Principles and practices of inhalational therapy. Philadelphia: Lippincott, 1944; chap 1
2 Haldane JS. Symptoms, causes and prevention of anoxaemia (insufficient supply of oxygen to the tissue) and the value of oxygen in its treatment. BMJ 1919; 2:65-71
3 Barach AL. The therapeutic use of oxygen. JAMA 1922; 79:693-99
4 Standards of effective administration of inhalational therapy. JAMA 1943; 121:785-59