

Fundamentals of Mechanical Ventilation: A Short Course on the Theory and Application of Mechanical Ventilators. Robert L Chatburn RRT-NPS FAARC. Cleveland Heights, Ohio: Mandu Press. 2003. Soft cover, illustrated, 291 pages, \$59.95.

As perfectly stated by Robert Chatburn in his preface, most textbooks on mechanical ventilation that we educators use devote but a small fraction to how ventilators actually work. **Fundamentals of Mechanical Ventilation** was written with a goal in mind: lead the reader to expertise with the theory and tools of that art called mechanical ventilation. To do this Chatburn presents the concepts of mechanical ventilation from the perspective of the ventilator. He indicates that his book does not say much about how to use ventilators in various clinical situations, but he is overly modest, since the book is full of very useful clinical applications of theoretical concepts.

The contents are divided into 5 chapters plus 3 appendices. A very short "Introduction to Ventilation" (Chapter 1) includes a brief description of how breathing takes place. This is followed by "Introduction to Ventilators" (Chapter 2), "How Ventilators Work" (Chapter 3), "How to Use Modes of Ventilation" (Chapter 4), and "How to Read Graphic Displays" (Chapter 5).

Chapters 1 and 2 devote 16 pages (including key ideas sections and self-assessment questions) to describing breathing. A brief overview of minute ventilation, dead space, and gas exchange serves as an introduction to defining positive- and negative-pressure breathing and to describing the 2 classic types of ventilators: conventional and high-frequency. Chatburn wrote these 2 first chapters to direct the reader to the following chapters as he covers the basic concepts of mechanical ventilation.

In Chapter 3 Chatburn emphasizes the importance of "understanding how ventilators work, not just how to turn the knobs." He describes the 4 mechanical characteristics of ventilators: input power, power conversion, control system, and output. He then directs the reader to respiratory care equipment textbooks for details on ventilator design characteristics. This is also the chapter in which Chatburn first introduces a special

section called "Extra for Experts," which is specifically directed to the professional "who is in a position to teach mechanical ventilation and particularly for those involved with research on the subject." This chapter is of particular importance, because it gives a practical review of the variables of the mechanical breath: control, triggering, limiting, and cycling. Chatburn includes excellent detail and makes the distinctions between various modes very easy to understand. Table 3-1 illustrates the mode classification scheme published in *RESPIRATORY CARE* in 2001.¹ Chatburn uses this table as the backbone for detailed descriptions throughout the rest of the chapter. To wrap this chapter Chatburn classifies the ventilator alarms (Table 3-5) according to the event priority level, alarm characteristics, automatic reset, and the alarm event. This is one of the most comprehensive tables on alarms I have seen in a textbook.

Chapter 4 not only provides the reader with a basic approach to conventional modes of ventilation but also describes newer modes and their indications and clinical examples.

In the last chapter, Chatburn does not limit the presentation to a basic understanding of how to read graphic displays. In the section "How to Detect Problems" he provides critical information on ventilatory changes that clinically impact the patient and how these changes can be detected by reading the graphic displays.

Appendix I, "Answers to Questions," includes definitions, answers to true-or-false questions, multiple choice questions, and key ideas. This appendix is a fine compilation and explanation of all topics covered in the 5 chapters. It is the reader's opportunity to review mechanical ventilation in a very concrete fashion, right to the point. Appendix II contains a glossary. Appendix III, "Mode Concordance," shows the correspondence between the names of common modes and their breathing pattern classifications.

There are very few typographical errors; the most noticeable is on the back cover, under "Features." Although the table of contents carries all the headings in the textbook, it would have helped to use numerals as prompts, since it is sometimes difficult to distinguish headings from subheadings.

Numbers would also make the content look more organized.

The key ideas of each chapter are nicely boxed and hard to miss. However, some of the "Extra for Experts" sections, such as the one in Chapter 4, do not have clear boundaries and it is hard to tell where they stop. A change in the font or size might be a simple solution to consider for future editions. Though all the figures are clear, 3 of the 4 photos used in the book were not of good quality and were probably not necessary.

In Chapter 3 Chatburn repeatedly named a specific ventilator when describing modes. I would recommend against doing that because it can give the impression of favoritism for a particular machine.

I recommend this book to practicing clinicians in respiratory care and especially to faculty and students in respiratory care programs, who would benefit the most from the "Extra for Experts" sections and the self-assessment questions.

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REFERENCE

1. Chatburn RL, Primiano FP Jr. A new system for understanding modes of mechanical ventilation. *Respir Care* 2001;46(6): 604-621.

Cardiopulmonary Critical Care. Thomas L Higgins MD MBA, Jay S Steingrub MD, Robert M Kacmarek RRT PhD FAARC, and James K Stoller MD MSc FAARC. Oxford UK: BIOS Scientific Publishers. 2002. Hard cover, illustrated, 411 pages, \$84.95.

Does the world need another critical care textbook? This question is raised by none other than Thomas Higgins himself in his introduction to **Cardiopulmonary Critical Care**, the latest addition to my gaggle of intensive care books. Surveying the crowded shelf, I have to admit I asked the same question upon receiving this book to review. However, as Dr Higgins explains, this book is meant to inhabit a particular "evolution-

ary niche," as a reference text for medical students, residents, nurses, respiratory therapists, and others with episodic exposure to critical care but with little need, time, or money for the much larger tomes available. Having spent the last few months reading through this book, using it to teach in the intensive care unit (ICU), and loaning it to several residents and fellows, I must agree with the authors' premise and I admire their execution.

By design, **Cardiopulmonary Critical Care** is limited to cover only the physiology and management of respiratory and cardiovascular disorders, with a plan to produce later volumes covering other areas of critical care. Intentionally omitted from this volume are ICU aspects of gastroenterology, endocrinology, infectious diseases (except an excellent chapter on nosocomial pneumonia), and neurology/neurosurgery, among others. This at first might seem a crippling limitation for an ICU reference, but in comparison to unwieldy compendiums that can live only on book shelves (and never on the wards) and the portably encyclopedic but often painfully terse *The ICU Book* by Paul Marino the choice to limit this book's scope was wise and effective.

The book starts with several chapters devoted to respiratory and cardiac physiology, then delves into shock, myocardial infarction, acute respiratory distress syndrome, pulmonary embolism, and acid/base disorders, and then broader subjects such as postoperative care in the ICU. Importantly, several chapters address technical aspects of ICU care, such as mechanical ventilation (including lung-protective strategies, weaning, and noninvasive positive-pressure ventilation), vascular access, and hemodynamic monitoring, as well as fluid resuscitation and pressors. Coverage of each subject is generally quite thorough and occasionally even a bit too detailed for use as an easy reference. Fortunately, this over-exuberance is largely confined to the chapters on basic physiology.

In assessing this book overall, a natural point for comparison is the above cited, less current (1998) book by Marino, which targets much the same audience. The strength of Marino's book is its completeness, which often comes at the expense of readability. **Cardiopulmonary Critical Care** takes the opposite approach. I found many of the chapters of this book not only informative but actually enjoyable reading.

Much like Marino's book, **Cardiopulmonary Critical Care** is written at a level accessible to those encountering the ICU for the first time and organized in a fashion that allows those well-versed in critical care to easily focus on individual topics of interest. The authors' approach to each subject is strongly evidence-based, though (fortunately) with an appropriately reductionist view, yielding quick and meaningful interpretation of the literature. For example, the chapters on myocardial infarction, acute respiratory distress syndrome, and nosocomial pneumonia serve equally well as cohesive introductions to these subjects for students and as quick best-practice reviews for those already familiar with the topics.

The chapters on technical aspects of ICU management are outstanding. Subjects such as ventilator management, fluid resuscitation, and hemodynamic monitoring are cogently explained. The chapter on vascular access, though a bit wordy, is the best I've read and presents a series of excellent photographs detailing the relevant anatomy of vascular access.

Given the book's intended portability, its hard cover is a bit odd, and, as one resident remarked, its orange and green cover design looks a lot like an eighth grade math text. Outward appearances notwithstanding, the text is well illustrated, with fairly simple diagrams and tables that allow ready understanding of the material. The text is well (and relevantly) referenced, and the index is quite useful. There are very few typographical errors.

Though **Cardiopulmonary Critical Care** will not satisfy the hardboiled intensivist with sweeping scope and minute detail, it admirably accomplishes that which it sets out to do. It is an excellent resource for respiratory therapists, nurses, residents, and others who seek a thorough yet readable (and portable) reference text for their ICU work and is a strong alternative to *The ICU Book* for the subjects covered. I look forward to reading the planned companion volumes, which will cover other aspects of critical care medicine.

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Tissue Oxygenation in Acute Medicine. William J Sibbald MD, Konrad FW Messmer MD, and Mitchell P Fink MD, editors. (Update in Intensive Care Medicine, Volume 33, Jean-Louis Vincent MD PhD, series editor). Berlin Heidelberg: Springer-Verlag. 2002. Soft cover, illustrated, 378 pages, \$49.95.

This book is part of the prestigious series of monographs, "Update in Intensive Care Medicine," edited by Jean-Louis Vincent. The book is a collaborative effort of an international group of experts in the field of oxygen transport and tissue oxygenation. Its 24 chapters are grouped into 4 sections: "Physiology of Oxygen Delivery," "Hypoxia and Its Consequences," "Measuring Tissue Oxygenation," and "Blood and Blood Substitutes as Oxygen Carriers." Although there is variability of style among the contributors, the editors have compiled an impressive collection of complementary essays regarding this very important subject.

The first section addresses the basic mechanisms of heart-lung interaction and the effect of changes in intrathoracic pressure on venous return, left ventricular function, and cardiac output. Spontaneous inspiratory efforts decrease intrathoracic pressure, in particular during airflow obstruction, at times resulting in right ventricular overdistention and changes in left ventricular afterload. The concept that blood flow is not distributed equally among organs or even within tissues is also explored in this section. New mathematical modeling techniques, which use fractal analysis, provide the framework of new concepts in tissue blood flow heterogeneity, whereas metabolic indicators of oxidative metabolism can be used to determine the adequacy of cellular oxygen availability in relation to the metabolic requirements of the tissues. These metabolic markers include tricarboxylic acid cycle enzyme activity, the products of adenosine 5'-triphosphate (ATP) breakdown, such as inosine, and measurement of ¹³C-enriched glutamate with nuclear magnetic resonance.

Perhaps the least understood component of the oxygen transport cascade is the microvasculature, that vast array of microscopic vessels through which the red blood cells course as they release oxygen from hemoglobin. This section has a particularly lucid discussion on the relationship of tissue oxygen delivery, microcirculatory phenomena, and the local regulation of cellular