Respiratory Care
Principles and Practice
THIRD EDITION

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It took 10 years between the first and second editions of Respiratory Care: Principles and Practice. The wait is much shorter for this, the Third Edition. This edition is, in essence, more of a continuation of a good thing rather than a completely new start. Ten years ago, some might have considered this text dead—but today it is alive and better than ever.

As in the Second Edition, patient assessment is covered at the beginning of the text, followed by respiratory therapeutics, respiratory diseases, applied sciences, and, finally, the professional aspects of respiratory care. The new edition offers us a welcome opportunity to build on the successes of the second edition. We have strived to hone this edition to address all of the topics important to contemporary practice in respiratory care. Recognizing the physiologic basis for respiratory care practice, we have added chapters specifically related to physiology; they complement the discussions of physiologic concepts already present in many of the chapters.

Use of extracorporeal membrane oxygenation (ECMO) has expanded considerably in recent years. Consequently, a new chapter dedicated to this topic has been added in the Third Edition.

The inclusion of new contributors to this edition has infused this text with new ideas and more thorough and contemporary coverage of many topics. No chapter has remained untouched; indeed, many have been substantially rewritten. This is a brand-new edition of an already solid text—not just the previous edition repackaged with a new cover. Many of the contributors are respiratory therapists, while others are physicians. This diversity underscores the close working relationship between therapists and physicians in everyday respiratory care practice. Many of the contributors are recognized leaders in the field.

All of the successful pedagogical features of the first and second editions of Respiratory Care: Principles and Practice have been retained in this edition. These features include the use of clinical practice guidelines, glossary terms, key points, and respiratory recaps. As with previous editions, the text is richly illustrated to enhance the learning experience. We have also added a new feature in this edition: Stop and Think boxes. Our intent in including them is to sharpen students’ critical thinking skills. The Stop and Think boxes pose questions that often do not have a clearly right or wrong answer; they should stimulate discussion among students and faculty. The questions are posed, but the answers are intentionally absent.

The respiratory therapist of the 21st century must be a technologist, a physiologist, and a clinician. He or she is expected to be a clinical leader, a role that includes having input into the development of multidisciplinary care plans and implementation of respiratory care protocols. Moreover, contemporary practice is evidence based. Each of these important tenets of modern respiratory care practice is carefully and deliberately incorporated into this text.

The primary audience for this text is respiratory therapy students. We have written this text for students while considering the examination matrix of the National Board for Respiratory Care (NBRC), to ensure that all of the topics on the board exams (and more) are included. Nevertheless, this volume is more than just a text designed to ensure success on the board exams. It includes many topics that go beyond the NBRC exam matrix and that are intended to help students become well-rounded members of the patient care team.

Our goal was to make this text readable and to put the content within reach of students. As part of this effort, we have included boxes, tables, and illustrations to assist learning. We have carefully edited the text for consistency in writing style throughout, but we have not diluted the content. The material may be challenging in some places, but the intent was not to make it difficult. Rather, we seek to help students maximize their contributions when interacting with physicians and other members of the healthcare team. An important aspect of professional interactions is the ability to use the language that others use at the bedside; whether a respiratory therapist, physician, nurse, or other healthcare professional, the language should always be the same.

Although this text is intended primarily for students, it will prove useful for other individuals as a reference
text. For the respiratory therapist who graduated from school some time ago, this text will serve as a refresher and update. For readers who are not respiratory therapists, the content should provide insight into respiratory therapy practice and serve as a reference text.

Innumerable persons must be thanked for their contributions to this project. First, I thank my co-editors. They embraced the vision and worked hard to make this text the best that it can be. Second, I thank all of the contributors, who dealt with my prodding to complete their chapters to my own and the publisher’s expectations. Finally, I am grateful to the team at Jones & Bartlett Learning, who poured their talents into this project and went out of their way to make this text second to none. The commitment of the Jones & Bartlett team has kept this project alive and moving forward.

It is my hope that the third edition of Respiratory Care: Principles and Practice will assist students in mastering the art and science of respiratory care, that it contributes to improvements in the stature of the respiratory care profession, and—most importantly—that it improves the care of patients with respiratory disorders.

Dean R. Hess, PhD, RRT, FAARC
Respiratory Care: Principles and Practice, Third Edition incorporates a number of engaging pedagogical features to aid in the student’s understanding and retention of the material. A colorful layout enables ease of comprehension and supports the retention of important concepts. More than 580 full-color photographs and more than 300 tables and equations provide valuable insight into the fundamental aspects of respiratory care practice.

Chapter Outline and Objectives
Each chapter begins with a framework for learning the most important topics by presenting an Outline indicating the material to be discussed and Objectives that list the chapter’s desired learning outcomes.

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**Key Terms**

Key Terms list the most important new terms covered in the chapter; correlating definitions can be found in the end-of-text glossary.

**KEY TERMS**

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**Boxed Features**

- Respiratory Recap Provides a review of key study points for core content
- Stop and Think New feature to this edition, which offers considerations for critical thinking and clinical decision making
- Age-Specific Angle Covers unique differences that are age specific—pediatric/neonatal focused or geriatric

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**Respiratory Recap**

**History of Present Illness**

- Onset
- Location
- Duration
- Character
- Associated manifestations
- Relieving factors
- Treatment
Guidelines are crucial in the evaluation and management of patient care.

**Clinical Practice Guidelines**

These Guidelines list a review of **Indications**, **Contraindications**, **Hazards and Complications**, and **Limitations** according to AARC Clinical Practice Guidelines. The

**TABLE 1-4**

**Glasgow Coma Scale**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td>In response to voice</td>
<td>3</td>
</tr>
<tr>
<td>In response to pain</td>
<td>2</td>
</tr>
</tbody>
</table>

**Key Points**

A list of bulleted statements appears at the end of each chapter. These **Key Points** recap a summary of the most important points in the chapter.

- The health history provides a detailed, chronologic record of the patient.
- The HPI offers a description of the onset of the problem, whether it developed suddenly, and the setting in which it developed.
- The four examination techniques commonly used are inspection, palpation, percussion, and auscultation.
- The use of accessory muscles implies an increased work of breathing.
- The assessment of respiratory expansion helps determine whether the lungs are expanding symmetrically.
- Auscultation of the chest allows assessment of diminished breath sounds, bronchial breath sounds, and adventitious breath sounds, such as crackles, rhonchi, wheezing, stridor, and pleural friction rubs.
- Listening to heart sounds involves notations of the rate and rhythm, extra heart sounds, and murmurs.
About the Editors

Dean R. Hess, PhD, RRT, FAARC
Dean R. Hess is Assistant Director of Respiratory Care, Massachusetts General Hospital, and Associate Professor of Anesthesia, Harvard Medical School. He has more than 40 years of experience in respiratory care, including clinical, research, teaching, and administrative responsibilities. Since 2008, he has been Editor-in-Chief of Respiratory Care, the official science journal of the American Association for Respiratory Care. He is on the Editorial Boards of the Journal of Aerosol Medicine and Pulmonary Drug Delivery, and Simulation in Healthcare. His research interests include aerosol delivery techniques, adult mechanical ventilation, and critical care monitoring. He is a Fellow of the American Association for Respiratory Care, the American College of Chest Physicians, and the Society of Critical Care Medicine. He has published more than 200 papers and several books. His books have been translated into several foreign languages. He has had a high level of professional activity, including committee appointments with the American Association for Respiratory Care, the American Thoracic Society, the Society of Critical Care Medicine, and two years as President of the National Board for Respiratory Care. He has lectured extensively throughout the United States and around the world. He has received numerous honors including the Forrest M. Bird Lifetime Scientific Achievement Award; American Association for Respiratory Care Life Membership; American College of Chest Physicians Simon Rodbard Memorial Honor Lecture; Jimmy A. Young Medal; Robert H. Miller, RRT, Award; Chadwick Medal; Shubin-Weil Master Clinician/Teaching Award; SCCM Presidential Citation; and the Hector Leon Garza MD Achievement Award. He has received teaching awards from the medicine residents at the Massachusetts General Hospital and the Harvard Pulmonary and Critical Care fellowship program.

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Neil R. MacIntyre is a native of Southern California but received his medical degree and internal medicine training at Cornell University in New York City. After three years of service as a U.S. Navy flight surgeon at the Naval Aerospace Medical Research Lab in Pensacola, Florida, he returned to California for a pulmonary disease fellowship at the University of California, San Francisco. He was then recruited to the faculty at Duke University where he has spent the remainder of his career. At the present time, he is Professor of Medicine (with tenure), Senior Clinical Advisor of the Pulmonary/Critical Care Division, and Medical Director of Respiratory Care Services. His research interests range from clinical pulmonary physiology to large-scale randomized trials in COPD and acute respiratory failure. Currently he is on the Steering Committee of two large NIH multicenter trials: the Long-Term Oxygen Trial (LOTT), and the COPDgene Network. He was also on the Steering Committee of the NIH Acute Respiratory Distress Syndrome Network (ARDSnet) for its duration. To date he has published more than 200 peer-reviewed articles and reviews, is the editor/co-editor of eight books, and is on the editorial boards of five journals. He is the past president of the American Lung Association of North Carolina, and the National Association of Medical Directors of Respiratory Care, and he is the current Vice-Chair of the American Respiratory Care Foundation. Important honors include Alpha Omega Alpha, the Surgeon General’s Award for Aviation Medicine, the Forrest M. Bird Lifetime Scientific Achievement Award, and the Jimmy A. Young Medal from the American Association for Respiratory Care. He is listed in both “Best Doctors in America” and “Who’s Who in the World.”

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