
Noninvasive Ventilation. The Essentials

Series Editor

Antonio M. Esquinas , Hospital Morales Meseguer, Murcia, Spain

Nowadays, Noninvasive Ventilation (NIV) is widely accepted in medical practice. This Series, titled "Noninvasive Ventilation: Clinical and Practice," is a culmination of extensive prior publications on the topic. It aims to define current clinical developments in NIV technologies, including equipment and ventilator modes, and provide practical recommendations primarily in Critical Care (CC), Pulmonary, Emergency, and Sleep Medicine.

Building on previous publications, a group of experienced Editors and top international contributors aim to present new books that take a multidisciplinary approach and provide a comprehensive overview of Non-invasive Ventilation. The main goals of this Series are as follows:

- Establish a scientific reference for NIV clinical practice, covering pathophysiology, clinical indications, and evidence-based concepts
- Present significant advances in CC, pneumology, anesthesiology, sleep medicine, pediatrics, and healthcare organization in acute and chronic respiratory failure
- Analyze technological advancements and complementary procedures associated with NIV, such as aerosol therapy, humidification, and airway clearance, crucial for effective NIV techniques.
- Serve as a valuable teaching reference for healthcare professionals, including residents, consultants, and allied healthcare professionals, as well as undergraduate and postgraduate students and fellowship participants.

The Series will produce focused thematic volumes, led by internationally recognized guest editors, providing comprehensive coverage of specific areas of NIV advancement in CC, emergency medicine, pulmonary, and sleep medicine.

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Editors

Biphasic Cuirass Noninvasive Ventilation

Science and Clinical Practice

 Springer

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This textbook exists because of the dedication, skill, and perseverance of countless individuals who care for patients with respiratory failure across ICUs worldwide.

To the respiratory therapists, whose expertise forms the foundation of safe and effective negative pressure ventilation—we are indebted to your vigilance, technical mastery, and unwavering advocacy for patient comfort and dignity.

To the ICU nurses, who remain the constant presence at the bedside, balancing precision and compassion, adjusting therapies minute by minute, and ensuring that complex respiratory support strategies are carried out with extraordinary consistency and care—thank you.

To our critical care physicians, advanced practice providers, fellows, and trainees, whose curiosity and commitment continue to advance the science and practice of NPV—your contributions shape the future of this field.

To the biomedical engineers, innovators, and industry partners who work tirelessly to improve technology, safety, and usability—this book reflects your impact as well.

Our deepest gratitude extends beyond professional roles or institutional walls. We especially acknowledge healthcare workers serving in conflict zones and areas of humanitarian crisis—physicians, nurses, respiratory therapists, paramedics, and volunteers—who continue to deliver care amid bombardment, displacement, shortages, and unimaginable danger. Many have lost their lives over the past several years while trying to save the wounded and critically ill, often children. Their courage represents the highest ideals of our profession. Their sacrifices remind us that medicine is not only a scientific endeavor but also a profoundly moral one.

This book is dedicated to all who serve, teach, innovate, and stand at the bedside—often quietly and anonymously—to improve the lives of patients who depend on us.

*Omar Alibrahim, Umberto Vincenzi, and
Nabil A. Shallik*

About the Book

In the history of respiratory support, negative pressure ventilation has long occupied a unique place—once a lifesaving mainstay, later overshadowed by positive pressure technologies, and now re-emerging with renewed relevance. This textbook arrives at a critical moment, filling an important gap by offering the first comprehensive and contemporary exploration of noninvasive negative pressure ventilation across pediatric and adult critical care.

What distinguishes this work is not only its scientific rigor but also its grounding in the lived realities of bedside care. Negative pressure ventilation, more than many therapies, requires collaboration: respiratory therapists adjusting pressures and seals, nurses monitoring comfort and positioning, physicians interpreting physiology and response, engineers refining interfaces and devices. This book honors that collective expertise and provides a roadmap for clinicians seeking to apply NPV with precision and purpose.

But its significance extends beyond technology and clinical algorithms. This text carries a profound acknowledgment of the global community of healthcare workers whose commitment to caring for the critically ill persists even under the most dangerous circumstances. Numerous clinicians in war zones and humanitarian disasters have lost their lives while treating injured and critically ill patients—often working in makeshift ICUs, basements, field hospitals, or facilities under active siege. Their bravery is not abstract; it is a daily act of service carried out amid risk, scarcity, and fear, motivated solely by the belief that every human life deserves care.

In highlighting these individuals, the editors remind us that critical care is both a science and a calling. It demands technical excellence, but also resilience, courage, and unwavering humanity. This book stands as a testament to that dual identity.

For trainees, it offers clarity.

For seasoned clinicians, it offers depth and renewed perspective.

For the field, it establishes an essential foundation on which future research and practice can be built.

It is a privilege to introduce this remarkable contribution to the respiratory and critical care communities.

Omar Alibrahim
Umberto Vincenzi
Nabil A. Shallik

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