Can J Anesth/J Can Anesth (2016) 63:903–904
DOI 10.1007/s12630-016-0610-5

BOOK AND NEW MEDIA REVIEWS

Lung Ultrasound in the Critically Ill – The BLUE Protocol

Daniel A. Lichtenstein. **Springer International Publishing Switzerland 2016; Hardcover $149 eBook $109; 376 pages ISBN 978-3-319-15370-4**

André Denault, MD, PhD · Martin Girard, MD · Yiorgos Alexandros Cavayas, MD

Received: 27 January 2016 / Accepted: 2 February 2016 / Published online: 29 February 2016

Lung Ultrasound in the Critically Ill is a monograph by Daniel A. Lichtenstein, who is recognized as an international leader in lung ultrasound. Dr. Lichtenstein first introduced the "BLUE protocol" in a landmark article published in 2008 (Chest 2008; 134: 117-25). The "BLUE protocol" concept was expanded in a series of articles by the author and his colleagues and was rapidly adopted worldwide. The current book, subtitled "The BLUE Protocol", comprehensively covers what the author and his collaborators previously published. Importantly, it further develops some of these concepts.

The book is divided into four parts (40 chapters total) and a glossary. It is richly illustrated in still images and 28 videos that are available online on the editor's website (http://link.springer.com/book/10.1007/978-3-319-15371-1).

In part I, the author explains basic knobology, equipment requirements, and the basic principles of lung ultrasound. It includes a description of the various artefacts encountered when performing the BLUE protocol. Part II presents a more detailed approach to the BLUE protocol, with chapters dedicated to specific diagnoses such as pneumonia, pulmonary edema, chronic obstructive pulmonary disease and severe asthma, pulmonary embolism, and pneumothorax (chapters 23-27, respectively). In part III, the author describes the application of lung ultrasound in patients with acute respiratory distress syndrome (chapter 28). He also tries to raise awareness about the limitations and complications of using *x-ray*-based techniques (chapter 29). This section also proposes an approach to circulatory failure (chapter 30) and cardiac arrest (chapter 31). In part IV, the use of ultrasound in other fields is explored, including in neonatal medicine (chapter 32), outside the intensive care unit (chapter 33), and in other parts of the body such as the vasculature, optic nerves, and abdomen (chapter 34). In chapter 35, Dr. Lichtenstein presents the "Extended-BLUE Protocol", which deals with more complex situations. The last chapters address issues such as equipment, training, resources, and the philosophy of bedside ultrasound.

Before reading it, the reader is advised to be aware of the glossary at the end of the book because many terms in the book are not commonly used in current anesthesiology and critical care practice in North America. Terms and acronyms such as LUCI, FALLS, HPE, and PIPE are not necessarily intuitive. Readers should also note that, aside from the BLUE protocol *per se*, none of the other proposed algorithms (e.g., SESAME, FALLS, E-BLUE) have yet to be formally validated. Dr. Lichtenstein is a strong proponent of the use of simple, dedicated, inexpensive machines for bedside ultrasound. Given the current prevalence of ultrasound systems in most modern intensive care units, we wished Dr. Lichtenstein had spent less time trying to convince the reader of the

A. Denault, MD, PhD (✉)
Department of Anesthesia, Montreal Heart Institute, Université de Montréal, Montreal, QC, Canada
e-mail: andre.denault@umontreal.ca

A. Denault, MD, PhD · M. Girard, MD · Y. A. Cavayas, MD
Division of Critical Care, Centre hospitalier de l'Université de Montréal (CHUM), Montreal, QC, Canada

M. Girard, MD
Department of Anesthesia, Centre hospitalier de l'Université de Montréal (CHUM), Montreal, QC, Canada

Y. A. Cavayas, MD
Department of Medicine, Centre hospitalier de l'Université de Montréal (CHUM), Montreal, QC, Canada

inferiority of their equipment and explain how to make the best use of it. Modalities such as Doppler are not covered or seen as essential for use in critically ill patients. In fact, he shuns most quantitative measurements. This approach has some merit as complexity does not necessarily equal efficacy or outcome. Over the years, we have witnessed technology miniaturization, improved image quality, and reduced cost in the field of bedside ultrasound. As a corollary, the Model T Ford could still be used today to take someone from point A to point B, but technological improvements are now available, such as the ability to heat or cool it or to enjoy a radio broadcast. Doppler, strain imaging, and three-dimensional echocardiography are now standard tools for evaluating the heart, with the potential to evaluate other organs as well, including the lung. They should be studied and compared to traditional modes of evaluation. As the author mentioned, however, the vast majority of critical diagnoses can be made with simple, low-cost equipment.

The book reflects the colossal experience of a dedicated physician evaluating the lungs with simple ultrasound technology. It is rich in practical points, clinical pearls, anecdotes, and historical and philosophical citations. It portrays a simple, qualitative approach to bedside ultrasound in the most commonly encountered clinical scenarios in the critically ill. Its unified and simple approach is one of the great strengths of the book but also one of its greatest weaknesses. In our opinion, however, the author chose to overlook more complex, well-validated measurements that could be helpful in practice. Moreover, the book tends to oversimplify complex situations.

Dr. Lichtenstein is one of the pioneers of bedside ultrasound. Hence, the book is also the history of three decades of personal struggle to advance bedside ultrasound to where it is today. For those who want to deepen their understanding of lung ultrasound and do not mind the sometimes verbose writing, *Lung Ultrasound in the Critically Ill* is a unique book which we believe will become an instant classic.

Conflicts of interest Dr. Denault is on the Speakers Bureau for CAE Healthcare. Dr. Girard is a Consultant for GE Healthcare.