

**Spirometry: General Aspects of the Technique and a Guide for Test Interpretation.** José J Almirall-Collazo MD MSc PhD. Self-published via Lulu.com. Quebec, Canada. 2010. Soft cover, 123 pages, \$29.97.

According to the author's preface, this book "was written with the main intention of disseminating information about spirometry, hoping that this will contribute to a more widespread use of the test in clinical practice." He has divided the book in 2 parts; the first part covers the general aspects of the technique, and the second part the interpretation. He aims the first part to students and health professionals not working with pulmonary function testing, who want information on this subject covered only by a few pages in textbooks. The second part of the book is also directed to students and health professionals not working with spirometry, but also it may be of interest to technicians, nurses, and physicians already working with spirometry.

These are laudable aims, particularly with the current interest in early diagnosis of COPD. I will review the chapters and evaluate how he meets these aims.

Chapter 1 is an introduction to spirometry and spirometers (6 plus pages), and covers the essentials well.

Chapter 2 is titled "What do we measure with spirometry?" He first reviews basic information about the structure of the airways, the respiratory bronchioles and terminal lung units, and the increase in total cross-sectional area in the peripheral airways. He points out that the small airways (< 2 mm in diameter) contribute only a small proportion of the total airway resistance, and that they are the "quiet zone" of the lung, making it difficult to detect disease until it is advanced. Then there is a paragraph about the limitations of spirometry.

Before discussing spirometry, he first defines the static lung volumes and capacities, and illustrates these with a figure. He points out that total lung capacity, functional residual capacity, and residual volume cannot be directly measured by spirometry, but does not mention the techniques used, which are not within the scope of the book.

Then there are 2 pages devoted to minute ventilation, including a diagram showing the

ventilation cycle and inspiratory and expiratory time. However, he analyzes this further by showing an equation deriving mean inspiratory flow, and then mentioning that this index reflects inspiratory drive. I think this information is unnecessary and may confuse persons with no experience in respiratory physiology. He has a page devoted to maximal voluntary ventilation, and although this test is rarely used now, it would be reasonable to include it as background information.

Then he has 5 and a half pages devoted to spirometry, including 4 figures illustrating a forced expiratory spirogram and a forced expiratory flow-volume curve, forced expiratory and inspiratory spiograms, and a flow-volume loop. This section is well written and clear.

Chapter 3 is devoted to "Forced Expiration: Parameters and Performance." This is a good review of the measurements made from the forced expiratory spirogram, and flows from the forced expiratory flow-volume curve. He also reviews the measurement of the 6-second forced expiratory volume (FEV<sub>6</sub>) as a substitute for FVC.

In the last section of this chapter, "Quantifying a Forced Expiration Without a Spirometer," he refers to a test that has the subject try to blow out a lighted match or candle to assess the presence of airflow obstruction. He shows results from a "candle test" published in 1990. He does not give the specifics of the candle used in that study, but shows the regression equation relating FEV<sub>1</sub> to candle distance and includes a table that shows the FEV<sub>1</sub> for different candle distances. It would have been advisable to check for any follow-up information in the literature and from those authors, about the present status of that test. It would be preferable to recommend using hand-held peak flow meters, which are now readily available, and are well standardized and widely used in the monitoring of asthma.

Chapter 4 adequately reviews "Variability in Spirometry" over 3 pages. He considers technical variation and intra-subject and inter-subject biologic variability as it relates to comparison with predicted values. He also considers effects of disease in causing an obstructive pattern and introduces

the concepts of obstructive and restrictive dysfunction.

Part 2, on spirometry interpretation, starts with Chapter 5, "General Aspects of Spirometry Interpretation" (5 and a half pages, 4 figures), which discusses the patterns of spirometry showing good effort, submaximal effort, improper start, premature end of forced expiration, and cough. It also shows the flow-volume loop patterns of peripheral airways obstruction and of obstructing lesions of the central airways.

Chapter 6 is "What Do All the Numbers Mean?" (12 pages, with 12 short tables). He uses the National Health and Nutrition Examination Survey III reference equations for Caucasian Americans, African Americans, and Mexican Americans, points to a reference equation calculator available on the internet from the National Institute for Occupational Safety and Health to get lower limits of normal, and, in appendix 2, provides tables for those 3 ethnic groups' predicted values and lower limits of normal for different age decades and heights.

He shows 11 different examples (in 11 tables) of forced vital capacity (FVC), FEV<sub>1</sub>/FVC%, FEV<sub>1</sub>, and forced expiratory flow during the middle half of the forced vital capacity maneuver (FEF<sub>25-75</sub>) values, with different patterns and discusses the interpretation. The approach and discussion are good. Table 12 shows the classification of the severity of airflow obstruction based on percent-of-predicted FEV<sub>1</sub>.

In Chapter 7, "Bronchodilator Response" (4.5 pages, with 2 figures), he quotes the American Thoracic Society/European Respiratory Society criteria of a significant response to bronchodilator: an increase of 200 mL or 12%. He also presents a recent suggestion to express the bronchodilator response as a percent-of-predicted value. He has a figure to demonstrate that the FEF<sub>25-75%</sub> may decrease after a bronchodilator, because the increased FVC results in the FEF<sub>25-75%</sub> being taken at a lower lung volume after bronchodilator. He makes the point that to properly compare FEF<sub>25-75%</sub> before and after bronchodilator, one should compare the 2 at equivalent lung volumes: the iso-volume FEF<sub>25-75%</sub>. In the same example, the FEV<sub>1</sub>/FVC ratio decreases from 72.1% to 65.7% because of

the greater increase in FVC than FEV<sub>1</sub> after bronchodilator. These points may be better suited to persons already involved in spirometry than to persons starting to learn about it.

Chapter 8, "Interrelationship of Spirometry Parameters: a Graphical Approach," (10 pages, with 10 figures) uses graphs to analyze the effects of changes in FEV<sub>1</sub>, FVC, and FEV<sub>1</sub>/FVC, on FEF<sub>25-75%</sub>. This is too much information and of limited practical use for a person without a background in spirometry testing and in using the FEF<sub>25-75%</sub>.

Chapter 9, "Step By Step Analysis of Numeric Results," has 7 pages and one figure. The figure presents an algorithm for analysis of spirometry numerical results, to determine if the test is abnormal and to define the abnormality. The algorithm and the analysis appear correct, but it is difficult to go through the steps, because the steps in the figure are not numbered. Also the wording in the figure for step 6 ("FEV<sub>1</sub> < LLN?") is not matched by the text on page 77, where the question is "Is FEV<sub>1</sub> at or above the predicted value?" It would be easier to follow if the question in the text matched the wording in the figure and if the algorithm in the figure included the step numbers.

Chapter 10 has good interpretation exercises in its 12.5 pages.

Overall, I think Almirall-Collazo made a good effort in preparing this book. It will be useful for those with no previous spirometry experience and who want to get training and be involved in spirometry testing. It could also be of interest to respiratory therapists, technicians, nurses, physicians, and other health workers using spirometry.

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**Knowledge Translation in Health Care: Moving From Evidence to Practice.** Sharon Straus MD FRCPC MSc, Jacqueline Tetroe MA, Ian D Graham PhD, edi-

tors. West Sussex: Wiley-Blackwell. 2009. Soft cover, 336 pages, \$62.95.

A dispiriting truism of modern medicine is that clinicians routinely do not provide treatments proven to reduce complications and save lives. Even in the era of evidence-based medicine there exists a substantial gap between evidence and practice, leading to preventable morbidity and mortality. Respiratory care is not immune to this problem: multiple published studies demonstrate deficits in the quality of care for patients with severe respiratory disease. Unfortunately, lagging behind our understanding of the evidence gap is our understanding of how to bridge that gap. In contrast to our wealth of knowledge about the pathophysiology of disease, relatively little is known about strategies to implement evidence-based treatments in daily practice. The science of knowledge translation seeks to correct that deficit. Knowledge translation, defined as the systematic application of research findings to routine practice, is still an emerging field in healthcare delivery. But as governments, payers, and patients demand more accountability in healthcare, it is increasingly important that all healthcare practitioners be familiar with its tenets.

Individuals interested in learning more about the science of knowledge translation would do well to pick up **Knowledge Translation in Health Care: Moving from Evidence to Practice**, an introductory primer on knowledge translation and its application to clinical medicine. Recently published in its first edition, the book was developed by the Canadian Institutes of Health Research and the Li Ka Shing Knowledge Institute at the University of Toronto, 2 organizations that have pioneered efforts to better implement evidence-based practice in medicine. The editors are international leaders in the field, and they have assembled an impressive group of authors with broad expertise, ranging from medical informatics to organizational theory to models of behavioral change. Importantly, the authors are diverse in background: many have research training in the social sciences, which is a necessity for this type of multidisciplinary work.

The book is organized into 6 sections. Section 1 provides an introduction to the field of knowledge translation. Section 2 reviews the methods to generate and synthesize new knowledge, such as systematic

reviews, meta-analyses, and clinical practice guidelines. Section 3 presents a conceptual model for knowledge translation, the "knowledge-to-action" cycle, and reviews the evidence behind several common strategies for implementing new practices. These include passive practices such as education and audit and feedback, as well as more active approaches such as the use of information technology and organizational change. Section 3 also gives some helpful real-world examples of successful quality-improvement activities at the local and regional level. Sections 4 and 5 delve deeper into the behavioral change theories that underlie knowledge translation from a sociological perspective. Finally, Section 6 reviews strategies to evaluate the clinical and economic effects of knowledge translation interventions. Together, the sections give a "soup to nuts" overview of the knowledge translation process, beginning with creation of new knowledge and ending with the process for evaluating the success of efforts to implement evidence-based practices.

The text is most successful when it is most specific and practical. For example, the discussion of patient decision aids in chapter 2.3 clearly explains the utility and value of the various methods to help patients understand complex medical information and act on that information. Similarly, the discussion of the barriers and facilitators to implementing best practice, in chapter 3.4, rightly stresses the importance of systematically identifying knowledge gaps and barriers to quality of care at the local level, rather than adopting a "one-size-fits-all" approach. The book goes a step further by reviewing when and how to customize clinical practice guidelines to local needs. This advice is extremely useful for practitioners wishing to take part in local quality-improvement initiatives. Among the best chapters is a clear explanation of clinical study designs for evaluating knowledge uptake: this is essential reading for those involved in the practice of knowledge translation. And although it is delegated to an appendix, the book provides a stellar introduction to the ethics of knowledge translation, including a practical review of the ethical principles that guide evidence-based practice.

The book missteps when it ceases to be practical and offers more general guidance. Indeed, most of the book could be described as a theoretical rather than a practical guide.

