tory introduction to the concept of decision analysis.

The coverage of pulmonary physiology, pharmacology, and therapeutics is clearly the focus and strength of the book. Pharmacology and therapeutic considerations for cardiac drugs are generally oversimplified or omitted. For example, the idea that ACE inhibitors are both nephrotoxic and renoprotective is traditionally a difficult concept for students to grasp. The text simply states that ACE inhibitors can "cause renal damage even though they are also used to protect renal function" and does not provide an explanation.

The authors do not identify the book's intended audience; its depth of coverage is probably not sufficient for the book to be useful to students in pharmacy and medicine. My overall impression is that the book was designed with the respiratory therapy student in mind, intending to provide a student-friendly text that includes the drug-related information necessary to provide high-quality respiratory care.

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Learning Lung Sounds: Interactive Media Course for PCs, 2nd edition. RLH Murphy MD DSc and MA Murphy PhD RNCS ANP. Compact disc for Windows or Macintosh computers with Internet Explorer or Netscape. System requirements: Windows 95/98/ME/XP/NT/2000 or Macintosh operating system. Westborough, Massachusetts. 2001. $49.

Learning Lung Sounds, a new CD-based program of lung sound instruction is, as stated in the introduction, "Intended for everyone interested in clinical medicine, particularly students and residents in medicine, nursing, and respiratory care, as well as those in physician assistant, emergency care, and nurse practitioner programs." It is the work of a physician and scientist who has been consistently engaged in lung sound study and teaching for 3 decades. The program hits its intended mark but not as well as it could have.

The program is organized into several sections. The "Start" section appears when the program opens. It contains the credits, a short introduction, and concise instructions. The remaining sections are selectable at random from the home page.

The "Common Lung Sounds" section shows a graphic of conventional and timeexpanded lung sound wave forms, reprinted from a 1977 *New England Journal of Medicine* report by Raymond Murphy.[1] The terminology used in the graphic is dated and some of it is no longer used, including in the rest of this CD (eg, "sibilant rhonchus"). The sounds available in this section are selectable from a list. Once selected, the user sees a waveform with a color-coded indication of the respiratory phase. A click of the mouse plays the sound, generally a single breath that loops continuously until stopped by the user. Besides the discrete sounds, there are head-to-head comparisons of fine versus coarse crackles and wheeze versus rhonchus.

The "Sound Patterns" section contains a description of the sounds typically heard in 6 common conditions (asthma, heart failure, pneumonia, chronic obstructive pulmonary disease, bronchiectasis, and pulmonary fibrosis) and a variety of graphic aids. These include a 16-channel matrix on a diagram of the chest (see below) that allows the user to play the sound recorded at each of the 16 locations, static graphics of wheeze and crackle profusion (termed "rates") and, for 4 of the conditions, a 3-dimensional animation (see below).

The "Cases" section is a quiz. For each of the 7 cases, there is a clinical summary, 16-channel sounds, sound analysis, chest radiograph, and a multiple-choice question.

The "Help" section contains citations, troubleshooting assistance, a link to the Stethographics Web site, and a software use license.

Part of this program's strength is also the source of one of its weaknesses. The recordings are all made using a system developed in the author's laboratory. Their multichannel lung sound analyzer, named the Stethograph, employs a matrix of 14 microphones connected to stethoscope chest pieces embedded in a foam pad that is applied to the back of the patient. An additional microphone is applied to the trachea over the neck and another over the heart. Sounds are acquired simultaneously from all 16 channels. The recorded sounds are of good quality and generally free from artifacts. (One exception is the coarse crackle recording in the "Common Lung Sounds" section that contains a bothersome background buzz). The sound from any of the 16 channels is accessible by clicking on the waveform at the appropriate location on a schematic of the chest wall.

Although useful for research, I find the Stethograph to be of limited value as a teaching tool. It does allow the student to explore the sounds at different sites of the chest, and I enjoyed clicking on the different sites and hearing how the sound varied across the chest. However, this wears thin after a short time, and in most cases the multiple site recordings do not help the student recognize certain sounds, and many of the channels contain no useful sounds at all. The surfeit of sounds recorded simultaneously appears to be at the cost of longer sound recordings (most of those here are one breath only) and sounds recorded from different patients with similar conditions. I would have much preferred to have examples of sounds from a variety of patients with similar conditions, since all lung sounds do not sound the same. For instance: wheezes may be single, few, or multiple; rhonchi may be musical (as demonstrated in the CD) or coarse and nonmusical; and the stridor example appears to have been recorded at the neck, but it would have been useful to hear it also from the chest and from a few feet away, as that is how it is often first noticed. This program gives no sense of the spectrum of variability that exists among abnormal lung sounds, and this is its most serious deficiency.

In addition, the description of the recording technique and focus on time-expanded waveforms (a specialty of the author) would be of little interest to the intended audience. It appears that the authors could not resist directing some of the material at those with a special interest in lung sound physiology and technology. This appears in statements such as "when crackles are counted, one has to pay special attention to avoid counting the same crackle twice." The graphic information on wheeze and crackle rates (profusion) is also of questionable usefulness to the novice trying to learn clinical auscultation.

There is a 3-dimensional modeling function available for some of the sounds. It graphically displays the breathing phases as the schematic chest appears to expand and contract to illustrate inspiration and expiration. Representations of crackles and wheezes appear and disappear on the chest during breathing. This gave me the (probably unintentional) visual impression that they were arising from different locations *within* the chest. I liked

the schematic "breathing" chest as a means to orient the student to the phases of respiration, and I would have liked to see it incorporated into all the examples instead of the kymograph-style display that is mainly used throughout the CD.

The CD's packaging indicates that the program will run on a Macintosh or Windows-type computer. I tested it on a Sony VAIO laptop running Windows XP, on which it ran correctly and was easy and intuitive to use. The graphics were clear and uncluttered. The sections can be accessed in any order, so it is simple to go directly to whatever section is desired. On an iMac running OS 9.1 and Internet Explorer 5.1, the CD appeared to contain a variety of Windows-type programs and folders without organization or a place to start. Many of the components could be loaded and read individually in the Web browser, but the sounds would not play, and there were no links between the components. As tested, this is certainly not a Macintosh-compatible program.

In summary, I thought the program, as run on a Windows-type computer, served adequately as an introduction to lung sounds, but the lack of variety is an important weakness. The graphical aides are generally helpful and make good use of the CD medium. Future versions would benefit from a greater variety of lung sounds and should be better focused on the clinical user. Its flaws notwithstanding, this program is a useful although basic introduction to lung sounds.

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