video and audio clips and graphical displays of basic spirometry.

Links for the audio and video clips are located directly after the associated text. Text words representing common clinical signs or examination findings are highlighted (in blue, indicating a clickable link) to allow the user to pursue topics in more depth. The links lead to screens with glossary definitions, specific examples of questions to elicit pertinent history, clinical examination skills, or physiology review.

The user can easily maneuver among the categories, subcategories, links, and glossary, yet still return easily to a prior location. At the bottom of the screen is a navigation bar that retains a history of the current topic and subtopic or highlighted text selected. Clicking on any term listed in the navigation bar returns the screen to that field. A return key also appears on the navigation bar after reviewing a glossary term. Unfortunately, the program's technical ease can be a detriment. Since most of the information for each topic is presented over a series of many screens, retrieved by clicking through multiple links, the process of following links was often more apparent than the concepts presented on the screen. In addition, information is often presented in lists, and clicking an item in one list often generates a new list, and a new set of links. Since the program does not keep track of the links the user has already explored (ie, those terms remain highlighted in blue), it is easy to get lost in the maze of information being presented.

One of the biggest improvements this tutorial program could make would be to include a self-test at the end of each topic section. For the intended audience a self-test would provide a great motivational tool to process and retain key concepts.

Two technical design issues become apparent when operating this CD-ROM program. The first problem arises anytime the audio icon is selected; the CD-ROM drive runs for the entire duration of the audio clip, and the noise generated from the CD-ROM drive can compete with the narrator's voice and with faint audio segments, such as heartbeats. This problem can be overcome by raising the volume on the speakers attached to a desktop computer, but it would remain problematic for laptop computers. Unfortunately, because the program will not operate without the CD-ROM in the drive you cannot avoid this problem by installing the program to your hard drive.

The second technical issue is that some audio and video links are not able to play simultaneously. This problem is especially noticeable when viewing clinical cases. For example, when viewing the cases in the bronchiolitis and neonatal sections, it is not possible to watch the video while listening to the narrator describe the important features of the examination. In fact, when the audio clip is selected, the video screen shows a still image of an entirely different case.

Overall, the **Pediatric Respiratory Examination** CD-ROM program is a fun, easy-to-use, informative tutorial to explore physical examination sights and sounds. This program would make a useful adjunct to a physical diagnosis text and a guide to the art of good history-taking and clinical examination skills. The videos and narrated audios of patient examinations are a good way to reinforce the essential clinical skills of obtaining a good pediatric respiratory examination. It is like having teaching rounds in your own home. The program is also affordable, listed at $27. I would recommend it as a good resource to prepare the trainee for clinical rotations.

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Pediatric Respiratory Emergencies. An on-line education module at the Pediatric Education for Prehospital Professionals Web site, http://www.PEPPsite.com. Developed by the American Academy of Pediatrics. Published by Jones and Bartlett, Sudbury, Massachusetts. 2003. $14.95.

This module is part of an on-line education program designed to improve the prehospital care of critically ill children. Oriented toward first-responders (emergency medical technicians, paramedics, and others), the course was developed under the sponsorship of the American Academy of Pediatrics, with input from emergency physicians, nurses, and paramedics. Respiratory care and nursing professionals who work in emergency care should also find the module useful. It is designed to prepare participants for a hands-on workshop in which respiratory care techniques are demonstrated and practiced in a laboratory setting. Participants who successfully complete this and related modules in pediatric care are eligible for a certificate from the American Academy of Pediatrics. Although designed for continuing education of experienced professionals, it also seems appropriate for students in emergency medical technician or paramedic programs

The module covers respiratory physiology and pathophysiology, assessment, and basic and advanced life support techniques appropriate for the pre-hospital care of sick children. The module consists of a series of highly visual presentations of various topics, followed by interactive self-assessment tools. A series of case studies integrate the content of the sections, and then there is a self-assessment test.

The program ran smoothly with a high-speed cable Internet connection and a Compaq Presario computer with Windows XP and 265 megabytes of random access memory. The publisher warns that those who access the Internet via AOL or MSN Explorer will not be able to use the module's full-screen format. The publisher recommends accessing the Web site via Netscape or Internet Explorer. I was unable to access the module when my pop-up-window blocker (Pop-up Stopper, Panicware, Seattle, Washington) was activated. Once the module is up and running, however, the pop-up blocker can be reactivated without any problem.

The format closely resembles a slide show with sound. The user navigates through the presentation by clicking a "forward" button on the screen. The educational content includes mostly well designed graphics and tables. Animations, illustrations, and photographs accompany the written material. The sound portion of the module consists mostly of a narrator reading, verbatim, the text that appears with the graphics, but there are also samples of abnormal breath sounds. The user can view the module with or without sound. Also readily available are links to a thorough glossary of medical terms used in the presentation. Additional links to a help section and a frequently-asked-questions section took me to an unrelated safety training program also produced by the American Academy of Pediatrics.

Each section is followed by a group of "interactivities" that consist of multiple-choice questions, matching exercises, and similar assessment tools that highlight the essentials of the material covered. Each assessment portion is linked to a review slide.

The first section reviews basic respiratory physiology and compares pediatric and adult respiratory structure and function.

Given the diverse educational backgrounds of medical emergency first-responders, that is no easy task. Overall this portion of the module does a good job of distinguishing concepts such as tachypnea versus hyperventilation. The authors correctly emphasize that a rapid respiratory rate does not always result in true hyperventilation, and tachypnea may be present when minute ventilation is lower than normal. However, while emphasizing that point, they imply that high respiratory rates always lead to lower minute ventilation, regardless of any change in tidal volume. Furthermore, the material suggests that tachypnea is always a cause of, rather than a reflection of, poor oxygenation. The module also confuses mechanical and physiologic dead space, and it suggests that the pressure required to mechanically inflate the lungs is closely proportionate to patient size. This part of the program also contains a graphic comparing tidal volume (measured in cubic centimeters) to tablespoons. For example, it indicates that a newborn needs 2 tablespoons of air to make the chest rise. This approach does not seem helpful and is a departure from the relatively sophisticated educational level of the program as a whole.

Also included are sound clips of abnormal breath sounds such as stridor, wheeze, and crackles. These sound clips seem inferior to other readily available auscultation sound clips on the World Wide Web, such as The Rale Repository (http://www.rale.ca/). The program also strictly adheres to the use of the terms "crackle" and "wheeze." Though those terms are preferred by many authorities, participants should nevertheless be introduced to alternative terminology (ie, rales and ronchi) to facilitate communication with other health professionals.

The next section of the module covers assessment of the child with respiratory problems. Highlights of this section include the presentation of the "pediatric assessment triangle," which guides the responder through a rapid visual assessment of circulation, respiratory status, and activity level. This section does a good job of highlighting essential elements of the pediatric assessment that are often overlooked by adult-oriented providers: chiefly, the importance of the infant's or child's level or attentiveness, consolability, and ability to focus, in estimating the impact of any particular respiratory problem on the child's overall functioning. The program also does a good job of distinguishing between conditions that require rapid and intensive support (life-threatening respiratory failure) and those that need more conservative intervention (respiratory distress). Though these terms are not used with the precision they should be in the in-patient arena (where assessment of P_{aCO_2} is more practical), they serve to prepare the responder to rapidly apply the appropriate level of intervention.

This section also has a brief discussion of pulse oximetry. The authors state that arterial oxygen saturation can be misinterpreted in the chronically hypoxemic patient or when carbon monoxide poisoning is present, but they do not explain in what way it is misinterpreted or offer suggestions for a more precise estimation of oxygenation in those settings. The next section reviews treatment procedures, focusing on airway management, intubation, and oxygen administration. An important take-home message from this section is the importance of allowing the child to remain in his or her "position of comfort" (usually in the mother's arms) as much as possible during evaluation and treatment.

Upper-airway problems are discussed in the next section. For disorders of an infectious nature the main distinction the authors make is between viral and bacterial infections. A more useful dichotomy in the prehospital setting might be "severe" versus "moderate," since that would guide the responder more closely to the treatment techniques required. The authors also use the terms "croup" and "viral infection" interchangeably and do not define the anatomic location of the obstruction. Also discussed are soft tissue obstructions, foreign bodies, and anaphylaxis.

I noted one inconsistency in the didactic material and the self-assessment tools. The discussion of the clinical presentation of foreign bodies in the upper airway correctly points out that cough and stridor may be present, but the self-assessment tool at the end of this section lists "no cough" as the correct response on a question about the symptoms of foreign body aspiration, and likewise requires an answer of "no wheezing" to obtain a correct response.

Next the authors focus on lower-airway problems, principally asthma and bronchiolitis. The animated graphics in this section are among the best in the module, nicely illustrating, in a matter of seconds, the key components of the pathophysiology of asthma and bronchiolitis. Assessment and management are in separate sections. An excellent discussion on the role of asthma history in assessing the patient's risk for respiratory failure is misplaced in the treatment portion rather than in the assessment portion of the unit. Discussion of management options (including metered-dose inhalers versus nebulizers) is discussed, but practical details on their use are lacking.

Pneumonia, pneumothorax, and other alveolar disorders are discussed in the final section, which is entitled "Lung Disorders" but would perhaps be better named "alveolar" or "parenchymal" disorders. There are a few weak points in this section. The discussion of the pathophysiology of pneumonia is rather simplistic (eg, pneumonia results in "pus in the lungs") compared to, for example, the discussions of asthma and anaphylaxis. Later the authors state that pulmonary edema is not associated with cough. Meconium aspiration is discussed as well, with proper mention of the role of both foreign material and inflammation in the pathophysiology. However, in the self-assessment section that follows, meconium aspiration is defined simply as an inflammatory disorder. No other common neonatal disorders are discussed. The section on near-drowning neglects any discussion of managing commonly associated injuries such as cervical spine injury or head trauma.

A series of case studies with multiple-choice questions follows, which serves as both a self-assessment tool and a brief review of the module's essential points.

Despite some unevenness in the sophistication of the material presented, and a few conceptual and factual flaws, the module seems successful in driving home the actions required by the first responder, based on disease severity. Thus this module would seem to be a valuable teaching tool for its intended audience. Especially useful are its visual attractiveness and interactive features, which help maintain user interest.

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