Wheeze Detection in the Pediatric Intensive Care Unit

If one excludes cough from the acoustic signs related to respiratory disease, wheezing becomes the most common adventitious lung sound. The whistling tones of wheezing are understood to originate from airway wall flutter when flow becomes limited during airway obstruction.1 It is well recognized that “not all that wheezes is asthma,” but wheezing is most typically heard in patients with asthma. Questionnaires in epidemiologic surveys of asthma prevalence and severity (eg, the International Study of Asthma and Allergies in Childhood)2 depend on inquiries about recent and past wheezing episodes. Young children with acute obstructive airway diseases are often characterized as “wheezy infants.” Phenotypes of wheezing in early life have been described,3 but the diagnosis of asthma based on recurrent wheezing remains difficult in the individual young child.

Considering the importance of wheezing for the diagnosis and monitoring of asthma, it is surprising that the objective detection and characterization of wheezing has remained almost entirely in the domain of a few research laboratories. In this issue of Respiratory Care, Prodhan and colleagues report the comparison of wheeze detection by a computerized respiratory sound monitor versus by clinicians in a pediatric intensive care unit.4 Their accepted standard was the majority opinion of 4 experts who listened to the recorded lung sounds. There was moderate agreement between the computerized respiratory sound monitor and the experts on the presence of wheeze. The computerized respiratory sound monitor was more sensitive but not more specific than the health care professiona in their detection. It is unfortunate that the sponsoring manufacturer was unable to support the complete analysis of data from all 5 sensor locations. The random selection of the right posterior base as the solitary site of analysis may have added to the observed differences between the auscultating staff, particularly with regard to observations in recumbent ventilated patients.

Even if the automated detection, characterization, and quantification of wheezing were not significantly more precise than that by experts with their stethoscopes, there are undeniable advantages to computerized respiratory sound monitoring. Audio recordings can be shared and reviewed, whereas the impressions obtained during auscultation are subjective and have to be communicated in language-specific terms. An array of acoustic sensors allows simultaneous capture of respiratory sounds at multiple chest locations, which can provide a spatial view of regional airway conditions that cannot be gathered via sequential auscultation at multiple chest sites. Respiratory sounds are variable depending on airflow and on changes in airway status over time. Computerized monitoring of respiratory sounds can be done continuously over an extended period, which is not feasible with auscultation.

A computerized respiratory sound monitor allows objective characterization of respiratory sounds, which may offer a better understanding of wheezing in young children, as it relates to future outcomes.5 Computerized analysis may also help improve our understanding of the mechanisms of wheezing during inspiration—a finding that is more common than is generally recognized in acute asthma.6 However, wheeze is often absent and the chest can become “ominously silent” in the most severe asthma. It will therefore be important to include the measurement—or at least an acoustic estimate—of airflow7 in computerized respiratory sound monitoring.

Hans Pasterkamp MD
Division of Pediatrics and Child Health
University of Manitoba
Winnipeg, Manitoba, Canada

REFERENCES


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Correspondence: Hans Pasterkamp MD, Department of Pediatrics and Child Health, University of Manitoba, 840 Sherbrook Street, Winnipeg, MB R3A 1S1, Canada.