Parents’ Evaluations of Wheezing in Their Children With Asthma*

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Objective: Wheezing is a widely used physical sign of asthma that physicians assess in evaluation of their asthmatic patients. It may be possible to teach the parents to recognize it and to assess its severity so as to help them make better informed judgment in monitoring their children with asthma.

Study design: Parents were taught to recognize wheezing by placing their ear over the chest and in front of the open mouth of their child. One session lasting a few minutes was sufficient for teaching. Subsequently, the parent and a physician evaluated the child independently for the presence and the severity of wheezing categorized as easily, barely, and none detected, and results were compared. Severity of wheezing was also compared with peak expiratory flow rate (PEFR) whenever possible.

Results: Six hundred thirty-six observations were made in 89 parent-child pairs. Wheezing was detected by the physician in 64% of examinations and by the parents in 56% (p<0.001 by χ²). When the physician heard the wheezing easily on 240 occasions, the parents also heard it in 99%. When the physician heard the wheezing barely on 170 occasions, the parents heard it only on 68% of the time. Mean PEFR was 55% predicted when the parents heard the wheezing easily, 75% when heard barely, and 93% when not heard (the difference is significant, p<0.001 by analysis of variance).

Conclusions: Parents can be taught to detect wheezing in their child with considerable accuracy when it is easily detectable to a physician. Such skills should be helpful to the parents in monitoring their child with asthma and in deciding when to increase medications and when to seek emergency care.

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PEFR=peak expiratory flow rate

Key words: asthma; asthma exacerbation; asthma monitor; parents’ education; peak expiratory flow rate; wheezing

Asthma affects approximately 12 million people in the United States; approximately 4 million of them are younger than 18 years old, which has the highest prevalence rate among all age groups.

Enormous expenditures are spent in care of asthma. It was estimated that direct medical costs for patients younger than 17 years old, including visits to the physician’s office, hospital emergency departments, outpatient clinics, in-hospital care exceed $4.65 million in 1985 and increased another third by 1990.1

The parents of asthmatic children play an important role in the care of their children, often having to judge whether their children’s asthma is worsening and whether urgent medical care is necessary. Parents have few recognized tools or skills to make proper judgment, but they frequently describe wheezing in their children during acute exacerbations of asthma. Physicians routinely auscultate the chest with a stethoscope to detect auscultatory wheezing and without a stethoscope for audible wheezing in evaluating asthmatic patients. Wheezing, retraction of the intercostal and supraclavicular soft tissue, and appearance of respiratory distress are important signs of airway obstruction in children with asthma.2 In this article, our analysis is limited to wheezing.

The aim of this study was to evaluate whether parents can be taught to detect the presence and severity of wheezing in their child by carefully listening over the chest and in front of the open mouth, and whether the presence of wheezing detected by the parent was associated with increased airflow obstruction. Such skill should be helpful to the parents in monitoring their child with asthma, in deciding when to increase medication, and when to seek emergency care.

Methods

Eighty-nine sets of parents and children with asthma between 3 and 17 years old (mean, 6 years) were enrolled in the study. They were recruited in the Asthma Clinic, in the general pediatric ward, and in the emergency department. Parents were taught in an examination room in each location by one of us (H.L. and A.A.) to recognize wheezing by placing their ear over the sternum, between the scapula, in the axilla, and in front of open mouth. One teaching session lasted for 3 to 5 mins. Subsequent evaluation sessions were held in an outpatient clinic for 291 observations, on the hospital ward for 245 observations, and in the emergency department for 100 observations. Both the parent and one of the participating

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physicians evaluated the child independently for the presence and the severity of wheezing. The findings were not revealed to each other until after both examiners had completed the examination. Wheezing was assessed by parents and physicians as easily detected, when it was heard without any effort, barely detected, when it was heard only with careful attention, and none detected. The peak expiratory flow rate (PEFR) was used as a measure of severity of airflow obstruction. It was measured with a flowmeter (Wright Peak Flow Meter; Armstrong Medical Industries Inc; Lincolnshire, Ill) in triplicate when the child was able to learn to do the maneuver. The highest value was selected and presented as a percent of the predicted.3 The mean PEFR was expressed as percent predicted values ±SE for the categories of wheezing. Analysis of variance was used for statistical comparisons of PEFRs for the categories of wheezing.

RESULTS

Eighty-nine parents consisted of 77 mothers, 4 foster mothers, 3 fathers, and 5 grandmothers. They had education levels ranging from junior high school to college. None of the parents or the participating physicians had a known hearing defect, but no audiologic testing was performed for the study. Only when the child had wheezing was it practical to teach the parents to recognize it and grade its severity.

Six hundred thirty-six observations were made in 89 parent-child pairs. Sixty parent-child pairs had eight observations each (480), 20 had six observations each (120), and 9 had four observations each (36). One of the physicians examined the patient immediately after the parent's examination. Parents' findings by direct auscultation without a stethoscope were compared to the physician's findings with a stethoscope. Wheezing was detected by the physician with a stethoscope in 64% of the examinations, while it was detected by the parents in 56% of the examinations ($\chi^2$ p<0.001; Fig 1).

When the physician heard the wheezing easily on 240 occasions, the parents also heard it easily or barely in 99% of the examinations (Table 1). When the physician barely heard the wheezing on 170 occasions, only 66% of the time did parents hear it. When the physician heard no wheezing on 226 occasions, neither did the parents hear it in 99% of the examinations. Thus, the parents detected the easily detectable wheezing quite well and heard no wheezing when the physician heard none. But the parents often missed (32%) the wheezing when it was barely audible to the physician with a stethoscope (Table 1).

The accuracy of detecting wheezing in parents increased as they gained experience with examinations. Of the 60 patients who had eight observations each, parents detected wheezing 88% of the time in the first observation, 87% in the second, 92% in the third, 97% in the fourth, 98% in the fifth and sixth, and 100% in the seventh and eighth observations. Of the 20 patients who had six observations each, 80% detected in the first observation, 95% in the second, 90% in the third, and 100% in the fourth, fifth, and sixth observations. Of the nine patients who had four observations each, 75% detected it in the first observation, 59% in the second, and 100% in the third and the fourth observations.

PEFR was measured on 176 occasions in 27 patients aged between 7 to 17 years (mean, 12 years). When the wheezing was heard easily by the parents, the mean PEFR was $55±2.0%$ predicted. When it was heard barely, the mean was $75±2.5%$ predicted, and when it was not heard, the mean was $93±1.6%$ predicted (Fig 2). These values are significantly different from one another by analysis of variance (p<0.001). Easily audible wheezing was associated with a greater airflow ob-

![Figure 1. Detection of wheezing by physician (MD) and parents. Percent (±SE) of the 636 observations in which wheezing was detected (p<0.001 by $\chi^2$).](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21726/)

![Figure 2. Comparison of the mean PEFR percent predicted (±SE) to the parents' ability to detect wheezing as easily, barely, and none (p<0.001 by analysis of variance).](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21726/)

**Table 1—Severity of Wheezing (636 Observations)**

<table>
<thead>
<tr>
<th>Severity</th>
<th>MDs’ Assess</th>
<th>Parents’ Assess</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easily (%)</td>
<td>Barely (%)</td>
</tr>
<tr>
<td>Easily</td>
<td>240</td>
<td>225 (94)</td>
</tr>
<tr>
<td>Barely</td>
<td>170</td>
<td>5 (3)</td>
</tr>
<tr>
<td>None</td>
<td>226</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td>636</td>
<td>230</td>
</tr>
</tbody>
</table>

*Physicians’ (MDs') assessments by stethoscope.

1Parents’ assessments of wheezing heard over the chest with bare ears without stethoscope.

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striction. The parents detected wheezing in front of the open mouth in 129 of 636 observations (20%). When the wheezing was heard in front of the open mouth, the mean PEFR was 48±3.1% predicted. When it was heard over the chest only, the mean PEFR was 62±1.8% predicted. When wheezing was not heard, the mean PEFR was 93±1.6% predicted (Fig 3). These values are significantly different from one another by analysis of variance (p<0.001). Wheezing heard in front of the open mouth was associated with a significantly greater airflow obstruction.

**DISCUSSION**

Wheezing is one of the most widely used clinical signs of asthma. In evaluating a patient with asthma, the physician invariably auscultates the chest with a stethoscope to detect wheezing. Parents often describe wheezing in their child when respiratory symptoms are reviewed. Although wheezing is a widely used physical sign, its usefulness in judging severity of airflow obstruction has been questioned. In severe asthma, breath sounds may be diminished and wheezing may be absent, the so-called “silent chest” in severe asthma. Usually severe obstruction is associated with wheezing lasting most of the respiratory cycle and having a higher pitch. Recently, objective parameters of airflow obstruction such as PEFR have been emphasized for monitoring asthma. Young children, usually younger than 6 years, often cannot perform the peak flow maneuver reliably, and some parents are not compliant with peak flow measurement of their child. Since wheezing is already a familiar physical sign of asthma to many parents, we attempted to establish that wheezing can be detected reliably by the parents and it can be a useful sign of airflow obstruction in home monitoring of asthma.

Parents can be taught to detect the presence and the severity of wheezing in their children. Only one session, usually lasting a few minutes, was sufficient. The parents detected wheezing in 99% of the examination.

![Figure 3. Comparison of the mean PEFR percent predicted (±SE) to the parents’ ability to detect wheezing over the mouth, chest, and none (p<0.001 by analysis of variance).](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21726/)

Detection of wheezing requires no equipment for the parents. The skill, once acquired, can easily be applied as often as is necessary at any place and time. In this age of complex gadgetry, most parents were amazed and expressed a sense of confidence for acquiring such a basic skill that requires nothing but a bare ear. By teaching the parents skills to detect wheezing and teaching them also to use an objective parameter such as peak flow rate to monitor their children’s asthma at home, the parents will be better equipped to intelligently and actively participate in the management of their children’s asthma.

By learning the various skills to evaluate the child with asthma, the parents may be able to utilize the health-care resources more appropriately, for instance, seeking emergency care only when there is true worsening of clinical status and seeking emergency care without any delay when there is clinical worsening.

Establishing simple methods for evaluation of patients, especially those that include parents in decision making, can have a significant impact on health-care costs and the quality of care provided. One such strategy, parents’ evaluation of wheezing, one of the most common signs of disease, can be performed reliably by parents with a high degree of correlation to patients’ PEFR.

Early detection, proper treatment at home, and early communication with health-care providers may help to eliminate unnecessary outpatient and emergency department visits as well as decrease the need for hospitalization. Even modest decreases will result in saving major health-care dollars.

**REFERENCES**