

## Assessment of care of patients with asthma in a family practice training program

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To determine if primary care physicians have been adhering to guidelines set forth by the National Heart, Lung, and Blood Institute (NHLBI) Expert Panel Report *Guidelines for the Diagnosis and Management of Asthma*, the author gauged the use of peak flow meters in a hospital family training program. Specifically investigated were the physicians' response to results from the peak flow meters and their prescribing practices regarding the beclomethasone dipropionate metered-dose inhaler. Overall, the use of peak flow meters among the 20 patients included in this study averaged 70%, up from 10% in earlier studies. Similarly, 45% of these patients received prescriptions for beclomethasone metered-dose inhalers with spacer devices. Although these results appear to indicate that physicians are following the aforementioned guidelines, the author cautions that the peak expiratory flow rate measurement is not a perfect indication of asthma severity. Likewise, the spacer devices are not indicated for all patients with asthma who are taking inhaled corticosteroids. Finally, the author emphasizes that anti-inflammatory agents should be effectively used when indicated.

(Key words: asthma, peak flow meter, peak expiratory flow rate, chamber device, spacer device, therapeutic agents)

With an increasing emphasis on primary care, it is likely that more family practitioners will care for more patients with asthma. Past studies of care provided by primary care physicians to asthmatic

patients suggest room for improvement. Less than 10% of nonallergists were prescribing flow meters to measure peak expiratory flow rate (PEFR),<sup>1</sup> and less than 8% were prescribing spacer devices with inhaled corticosteroid multidose inhalers.<sup>2</sup> Spacer devices are recommended for administration of inhaled corticosteroids because spacers decrease oral deposition and adverse effects, including oropharyngeal candidiasis and throat irritation. An estimated 45% of patients are unable to coordinate the inspiration with the puffing and thus require a spacer for effective deposition of corticosteroids in the lungs.<sup>3</sup> The effect that spacers have on dysphonia<sup>4</sup> and deposition of medicine into the lungs in patients who correctly use metered-dose inhalers<sup>5</sup> is controversial. Despite this controversy, it is generally assumed that most patients will benefit from the use of a spacer device when administering inhaled steroids.

The use of peak flow meters is also controversial in that the PEFR measurement is not a perfect reflection of asthma severity. Children with moderately severe asthma may have normal PEFR variability.<sup>6</sup> Nonetheless, it appears that PEFR measurements can assist in both outpatient and inpatient care of the asthmatic patient.<sup>7</sup>

The intent of this present study was to see if the National Heart, Lung, and Blood Institute (NHLBI) Expert Panel Report *Guidelines for the Diagnosis and Management of Asthma*<sup>8</sup> has caused primary care physicians to increase their prescriptions of peak flow meters and chamber devices to their asthmatic patients. Specifically, this study gauged the prescribing of chamber devices and peak flow meters by primary care physicians in a hospital with a family practice teaching program. The assumption is that the greater use of these devices reflects an increasing knowledge of the aforementioned diagnostic and treatment guidelines for asthma.<sup>8</sup>

### Methods

The study was performed at a family practice training hospital (Charleston Naval Hospital, Charleston, SC).

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**Table 1**  
**Criteria Used to Assess Peak Flow Meter Use in a Family Practice Training Program\***

**Was peak flow done:**

- ☐ in the emergency room?
- ☐ on admission?
- ☐ before arterial blood gas volume was measured?
- ☐ during the patient's hospitalization?
- ☐ before the patient's discharge?

\*Based on the National Heart, Lung, and Blood Institute *Guidelines for the Diagnosis and Management of Asthma. National Asthma Education Program Expert Panel Report.* Bethesda, Md, US Department of Health and Human Services Office of Prevention, Education, and Control. NIH pub No. 91-3042, 1991.

**Table 2**  
**NHLBI\* Criteria Used to Assess Response to Peak Expiratory Flow Rate (PEFR)† Volume**

| PEFR†                          | Appropriate response                    |
|--------------------------------|-----------------------------------------|
| > 70%‡ in emergency department | Send patient home                       |
| < 70%‡                         | Start patient on corticosteroid therapy |
| > 50%‡                         | Avoid arterial blood gas testing        |
| > 70%‡                         | Patient can be discharged               |

\*Based on the National Heart, Lung, and Blood Institute *Guidelines for the Diagnosis and Management of Asthma. National Asthma Education Program Expert Panel Report.* Bethesda, Md, US Department of Health and Human Services Office of Prevention, Education, and Control. NIH pub No. 91-3042, 1991.

†Percent of expected value.

No other training programs were conducted at the hospital. The faculty consisted of a full range of physicians, including family physicians, internists, pediatricians, pulmonologists, and an allergist. Residents received education about asthma on a regular basis. This information included education on the management of both inpatients and outpatients with asthma. No formal education on asthma was made available to patients. The physician and respiratory technologists taking care of each patient conducted individual patient education.

The study was done in two parts. The first part entailed a record review of all patients with asthma admitted to the hospital in a family practice training program during December 1993 to June 1994. Patients with chronic obstructive pulmonary disease or a long history of tobacco abuse were excluded. Only 20 patients

admitted during this period met the inclusion criteria. The records were assessed for use of PEFR measurements at defined points during the hospital stay (*Table 1*).

In addition, the physician's response to the PEFR measurement was assessed to see if the family practice resident used the value appropriately (*Table 2*). These values are based on the NHLBI guidelines.<sup>8</sup> The guidelines suggest that patients who fail to increase their PEFR to greater than 70% of the predicted value after initial therapy in the emergency room receive steroids and receive increasing intensity of care. If the PEFR measurement is greater than 70% of the predicted value, discharge from the emergency department should be considered. If not, hospitalization may be indicated. The guidelines also suggest that an occasional need may exist to determine arterial blood gas volume. Blood gases should rarely be needed in patients with a PEFR measurement of greater than 25% of predicted value. Measuring arterial blood gas volume was considered inappropriate or contraindicated if done in a patient with a PEFR measurement greater than 50% of the predicted value.

The respiratory technologist measured PEFR as ordered by the resident. This value was recorded at the bedside. Response to these results was individualized, depending on the resident or staff physician (or both). The PEFR percentages are based on percentages expected because the majority of patients did not use peak flow meters before hospitalization; thus, their personal best was not known.

The second part of the study consisted of telephone patient interviews conducted by the author. Participants were selected from a list of patients who received prescriptions for a beclomethasone dipropionate metered-dose inhaler from the pharmacy associated with the family practice training program between January 1994 and March 1994. The beclomethasone metered-dose inhaler was chosen because it is not issued with a spacer device; an additional prescription is required for the spacer.

The interview was done to determine if the patient's physician prescribed a spacer. Patient compliance in using the chamber devices was not assessed. A total of 76 patients were interviewed.

## Results

Peak flow meters were used in 70% of the investigated points during hospitalization (*Table 3*). In 80% of the cases, the emergency physician determined the PEFR during therapy in the emergency department. Eighty percent of patients had PEFRs determined on admission to the ward and then at least daily during their hospital stay. The percentage of PEFRs done before an arterial blood gas measurement was 65%. The lowest percentage (50%) was measured before the patient's discharge from the hospital.

In assessing the response to PEFRs, only 49% of the patients had PEFRs that were correctly acted upon (*Table 4*). The two outstanding points occurred before arterial blood gas tests were measured and before the patient's discharge. Patients frequently had an arterial blood gas done despite having a



PEFR measurement that was greater than 50% of the expected value. In only 50% of the patients receiving arterial blood gases was the PEFR measurement less than 50% of the expected value.

The second point was that patients were often discharged despite showing no or minimal improvement in the PEFR measurement. Only 20% of the patients had a PEFR measurement greater than 70% of the expected value before discharge. Thus, it appears that even though PEFRs are frequently determined, they often are not acted upon correctly. This inaction could be the result of a lack of confidence in the technique or a lack of knowledge on interpretation of the values.

The survey of prescribing practices regarding the beclomethasone metered-dose inhaler demonstrated that 34 (45%) of the 76 patients were given a spacer device with their metered-dose inhaler. No demographic data were gathered from those patients interviewed, nor was an assessment done to determine whether the patient could use a metered-dose inhaler correctly. Despite the significant improvement from prior studies,<sup>1</sup> the number reported here, 34 (45%), was still less than expected, especially as it appears that the majority, if not all, patients will benefit from using spacer devices with inhaled corticosteroids.

## Discussion

It appears from this study that increasing compliance has occurred with the NHLBI guidelines for care of the asthmatic patient.<sup>8</sup> Studies done in 1988<sup>1</sup> demonstrated that only 8% of nonallergists and 35% of allergists were prescribing spacer devices with inhaled corticosteroids for their patients with asthma. The data reported here demonstrate that in a family practice training program, 34 (45%) of asthmatic patients receiving a prescription for beclomethasone metered-dose inhalers were given spacer devices. This number showed a large, unexpected increase. Using a spacer will increase deposition of the inhaled corticosteroids in the lungs of patients who cannot coordinate inspiration with puffing that is required with metered-dose inhalers. This group includes the young, the elderly, and a fair number of patients between the two extremes. A spacer device will also aid in the decrease of the incidence of oropharyngeal candidiasis and throat irritation.

However, with the proper metered-dose inhaler technique, spacers offer little (if any) significant improvement in corticosteroid deposition in the lungs compared with metered-dose inhalers alone.<sup>5</sup> Similarly, it does not appear that spacers decrease the systemic effects of inhaled corticosteroids. The median dose of inhaled beclomethasone dipropionate that caused hypothalamic-pituitary-adrenal suppression was 3.25 mg with the use of a spacer

**Table 3**  
**Results From Peak Flow Meter Use**  
**in a Family Practice Training Program**  
**(n=20)**

| Criteria                                            | Patients |      |
|-----------------------------------------------------|----------|------|
|                                                     | %        | No.  |
| ■ In the emergency room                             | 80       | 16.0 |
| ■ On patient's admission                            | 80       | 16.0 |
| ■ Before determination of arterial blood gas volume | 65       | 13.0 |
| ■ During patient's hospitalization                  | 80       | 16.0 |
| ■ Before patient's discharge                        | 50       | 10.0 |

**Table 4**  
**Percentage of Physicians Using NHLBI\***  
**Criteria to Respond to Peak Expiratory Flow**  
**Rate (PEFR) Measurements in a Family**  
**Practice Training Program**

| Criteria                                            | Physicians responding to criteria, % |
|-----------------------------------------------------|--------------------------------------|
| ■ Hospitalized patients had PEFR < 70%              | 60                                   |
| ■ Inhaled corticosteroids started for PEFR < 70%    | 65                                   |
| ■ Arterial blood gas not measured if PEFR > 50%     | 50                                   |
| ■ PEFR > 70% before patient's discharge             | 20                                   |
| ■ Overall appropriate response to PEFR measurements | 49                                   |

\*Based on the National Heart, Lung, and Blood Institute Guidelines for the Diagnosis and Management of Asthma. National Asthma Education Program Expert Panel Report. Bethesda, Md, US Department of Health and Human Services Office of Prevention, Education, and Control. NIH pub No. 91-3042, 1991.

er device and 3.0 mg when administered directly with a metered-dose inhaler.<sup>9</sup>

The use of peak flow meters has also improved from 10% in the late 1980s to 70% reported in this study. The peak flow meter is a simple, inexpensive instrument and is easily used. However, its limitations are that it is effort-dependent, the measurement fails to reflect small airway disease, and it does



not accurately reflect asthma severity. However, it does provide some objective measurement to be used in the treatment of asthma.<sup>10</sup> Because variability exists between meters and among types of meters, physicians always should have patients use their personal meter when comparing values.<sup>11</sup>

Despite an increase in the use of the peak flow meter, the value it determines is often acted on inappropriately. It is unclear whether this is due to a lack of confidence in the instrument or a lack of knowledge regarding what the actual PEFR value means. Whatever the reason, it is apparent that continued education is necessary. The PEFR value should *never* be used as the sole factor in assessing asthma severity. When available, the patient's history and results from the physical examination (including vital signs, the patient's comfort and ability to communicate, paradoxical pulse, and results from the pulse oximeter) should all be used—in addition to the PEFR measurements—to establish the severity of asthma and the required intervention. In rare cases, ascertaining the arterial blood gas volume may be necessary to further stratify care.

The NHLBI algorithm<sup>8</sup> for emergency room and hospital care of patients with asthma does specify arterial blood gas determination as a means to stratify patient care. The use of the arterial blood gas volume should be limited to patients with a PEFR measurement less than 25% of the predicted value.<sup>8</sup> Despite an adequate PEFR measurement in this study, the use of arterial blood gas volume determinations is of some concern. When PEFR values are close to normal, or even greater than 50% expected value, there should rarely be a need to order measurement of arterial blood gases. Using PEFR values as objective criteria instead of an arterial blood gas measurement will not only decrease the expense and time that an arterial blood gas study requires, but it will also decrease the risk of needle sticks during the procedure. With the increasing occupational risk of hepatitis B and C and exposure to the human immunodeficiency virus by healthcare workers, any technique that can reduce the risk of needle-stick exposure should be encouraged.

## Comments

It appears that compliance is increasing with the NHLBI Guidelines<sup>8</sup> for asthma care. Until a different technology is developed, such as a portable

meter to monitor forced expiratory volume in 1 second, the most accessible objective evidence we have to assess asthma severity is the peak flow meter. Caution is required in interpreting the results as the PEFR measurement is not a perfect reflection of asthma severity.

It is this author's opinion that spacer devices are indicated in all patients with asthma who are taking inhaled corticosteroids. Thus, use of spacer devices should be encouraged; however, in patients who master good technique, use of the metered-dose inhaler without a spacer may increase compliance. Encouraging patients to use a spacer must be taken in light of complicating therapy and, in some cases, leading to a decrease in compliance with anti-inflammatory agent regimens because of the added inconvenience of carrying a spacer. The most important point is to use anti-inflammatory agents effectively when indicated.

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