Barriers Pediatricians Face When Using Asthma Practice Guidelines

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Objective: To describe barriers to the successful use of the 1997 National Heart, Lung, and Blood Institute (NHLBI) asthma guidelines.

Methods: We conducted 3 focus groups to understand barriers to the use of 4 recommendations within the NHLBI guidelines (prescription of inhaled corticosteroids, recommendation of daily peak flowmeter use, smoking cessation screening and counseling, and allergen exposure counseling).

Participants: Twenty-one pediatricians and 1 nurse practitioner, who each followed an average of 47 patients with asthma, participated. Six participants (27%) had a faculty or adjunct appointment at a medical school. Nineteen (90%) of the 21 pediatricians were board certified.

Results: We identified 171 comments about barriers to adherence. Type of recommendation and physician year of graduation from medical school were related to which barrier was prominent. For corticosteroid prescription, senior physicians mentioned lack of agreement, whereas younger physicians described lack of confidence in dosing or recognizing contraindications. For peak flowmeter use, senior physicians emphasized lack of training. Only senior physicians described the inertia of previous practice as a barrier. All groups mentioned time limitations.

Conclusions: Efforts to improve adherence to asthma guidelines should consider the range of barriers that pediatricians face, such as lack of awareness, familiarity, or agreement, and external barriers owing to environmental, guideline, or patient factors. In addition, this study documents barriers not previously considered, such as lack of self-efficacy, lack of outcome expectancy, and inertia of previous practice, that prevent adherence. Because type of recommendation and physician demographics are related to which barriers are prominent, interventions to improve NHLBI guideline adherence should be tailored to these factors.


Asthma is the most common childhood disease, affecting close to 5 million children. In 1997 the National Heart, Lung, and Blood Institute (NHLBI) published the latest Guidelines for the Diagnosis and Management of Asthma to “bridge the gap between current knowledge and practice.” Guidelines should improve care by decreasing inappropriate variation and expediting the application of new advances.

However, the ability of guidelines to change physician behavior or patient outcomes has been limited. For example, a national survey of emergency department directors reported that only 46% of respondents were aware of the NHLBI asthma guidelines. Physician prescribing patterns also suggest that use of anti-inflammatory asthma medication is not consistent with NHLBI guidelines. In addition, the percentages of inner-city pediatric patients with asthma who use peak flowmeters (PFMs) (30%), take daily anti-inflammatory agents (39%), or use mattress covers (32%) also indirectly suggest poor physician guideline adherence.

Surveys of pediatrician attitudes about guidelines in general report barriers to adherence such as lack of awareness, lack of agreement with specific recommendations, or lack of agreement with the concept of guidelines in general. Regarding the NHLBI guidelines, barriers such as lack of familiarity and lack of agreement have been documented among internists. Additional hypothesized barriers to physician adherence include economic disincentives to perform recommendations, patient noncompliance, and inadequate time or resources to perform recommendations. Identification of these barriers can suggest opportunities to improve physician adherence and, thus, improve patient care.

However, we are not aware of any study that attempts to identify the broad range of barriers to the NHLBI guidelines...
We conducted 3 focus groups with primary care physicians and nurse practitioners to understand barriers to the successful use of the 1997 NHLBI asthma guidelines.

Because factors that affect adherence to guidelines are complex, we believe that focus groups are useful for investigating practitioner behavior and providing in-depth information about what people think or feel about an issue.13,14

PARTICIPANTS
Participants were practicing physicians and nurse practitioners attending a national continuing medical education (CME) conference at a university medical center. We conducted sessions at least 1 day before any presentations about asthma. No honorarium was offered.

We organized each group based on the participant’s year of graduation from medical school. From the distribution of years of graduation, tertiles were created. Twenty-two of 33 physicians who expressed an interest in participating were assigned to 1 of 3 groups based on the tertile of their year of graduation; the remaining 11 were placed on a waiting list. Two physicians who did not attend the focus groups were replaced by similar-aged physicians from the waiting list.

Twenty-one pediatricians and 1 nurse practitioner participated in focus groups of 6 to 8 participants (Table 1). Participants were 14 women and 8 men, representing 11 states and 1 foreign country, who each followed up an average of 47 patients with asthma. Fifteen of 21 participants indicated that they received a fixed salary.

The median year of graduation from medical school for each group was 1990, 1971, and 1961. All physicians completed a pediatric (n=20) or medicine-pediatrics (n=1) residency. Six participants had faculty or adjunct appointments at a medical school or residency program, and 19 were board certified in pediatrics.

CONDUCT OF SESSION
Two moderators (M.D.C. and B.E.E.), both aware of the research questions, led the focus group sessions using a format outlined by Krueger.14 The 1-hour sessions were taped in their entirety using nonconcealed microphones. Participants were informed that they could refuse to answer any questions, that they could leave at any time, and that transcripts would not contain participant identifiers. The study was approved by the institutional review board of Johns Hopkins Bayview Medical Center, Baltimore, Md.

that are encountered by pediatricians. The purpose of this study is to describe these barriers to the successful use of the guidelines and to identify strategies to improve adherence.

RESULTS
We identified 171 distinct comments about barriers to the successful use of the NHLBI guidelines and classified them within 1 of 6 internal barriers. The 171 comments referred to prescription of inhaled corticosteroids (n=36), recommendation of PFM use (n=25), smoking cessation counseling (n=18), and allergen exposure counseling (n=26). There were 66 comments about the guidelines in general. Fifty-one (30%) of 171 comments required adjudication, and 7 (4%) of 171 comments were considered ambiguous.

Different recommendations elicited different patterns of barriers. We present the different barriers mentioned with each guideline recommendation in the

ANALYSIS OF BARRIERS
Audiotapes of the sessions were transcribed verbatim, except for identifying information. Two investigators (M.D.C. and B.E.E.) independently read each transcript and marked off comments about barriers to adherence.

Two board-certified physicians, who were not present at the focus group sessions and were not involved in development of the model, independently classified each comment into a taxonomy, described in the following paragraphs. They were provided with a brief description of each category of barriers and asked to classify comments about barriers as internal barriers, external barriers that affected internal barriers, or ambiguous.

The taxonomy was based on a previously developed model of physician adherence based on a systematic review of the literature.15 The model suggests that guideline adherence depends on overcoming 6 internal barriers (lack of awareness, lack of familiarity, lack of agreement, lack of self-efficacy, lack of outcome expectancy, and the inability to overcome the inertia of previous practice) and external barriers (ie, patient, environmental, and guideline factors). In general, internal barriers affect adherence through a cognitive component (knowledge) or an affective component (attitudes), whereas external barriers affect adherence through restriction of physician ability.

According to the model, physician nonadherence occurs in the presence of any internal or external barrier. In addition, an external barrier may exacerbate an internal barrier. For example, lack of time during a patient visit (external barrier) may compromise a physician’s ability (internal barrier—lack of self-efficacy) to address PFM use for a patient with asthma (physician nonadherence). In another example, inadequate distribution of guidelines (external barrier) may affect physician awareness (internal barrier) of proper corticosteroid prescription for patients with asthma (physician nonadherence).

A third investigator (M.D.C.) adjudicated differences in classification. If differences remained, the comment was considered ambiguous and excluded from further analysis. Finally, 3 additional investigators (L.C.P., N.R.P., and C.S.R.) reviewed the general taxonomy of the barriers for relevance and consistency.

QUESTIONS
We asked open-ended questions to elicit barriers to successful use of the 1997 NHLBI asthma guidelines and specific recommendations within the guidelines. Questions (Table 2) were developed based on a review of the literature and were pilot tested with pediatricians in fellowship training.

Table 2

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Barriers to prescribing daily inhaled corticosteroids were related to lack of familiarity, lack of agreement, lack of self-efficacy, and lack of outcome expectancy (Table 3).

Physicians mentioned disagreement regarding the safety of long-term corticosteroid use as a barrier. "Everybody says there are no problems with inhaled steroids. I'm not so sure about that. We just don't have the experience. ... I think that without 30 or 40 years without using these things chronically, they can't really say that." Specific concerns included cushingoid effects, osteoporosis, growth stunting, and catact development. Some physicians preferred using cromolyn sodium to inhaled corticosteroids. Even if comfortable with prescribing corticosteroids, physicians mentioned that parental concern about corticosteroids made prescription difficult. Physicians may not have time or confidence in their ability to address parental concerns. Lack of an education program to which to refer parents and patients and poor continuity of care were grouped by year of medical school graduation.

Parental fear of corticosteroid adverse effects was associated with poor outcome expectancy as well. Parental fears, which some physicians perceive as media driven, were linked to noncompliance. "The parents pick up anything that gets onto one of those TV news shows, and it gives them another reason for not wanting to comply."

Barriers to recommending daily PFM use were related to lack of agreement, lack of self-efficacy, and lack of outcome expectancy (Table 4).

Physicians mentioned disagreement with PFM usefulness in general and reported recommending PFM use selectively. Barriers that affected self-efficacy included lack of office time to properly measure peak flow, inadequate staff or physician training, and poor follow-up to use PFM readings. Low outcome expectancy was mentioned in relation to poor patient compliance. Furthermore, patients were not always able to purchase or obtain PFMs because of lack of insurance coverage.

Barriers to screening and counseling were associated with lack of self-efficacy and lack of outcome expectancy (Table 5). Unlike other recommendations, lack of agreement or familiarity was not mentioned.

Barriers related to low self-efficacy included lack of training and lack of confidence in physician ability to counsel. If parents wanted to quit, pediatricians did not feel comfortable prescribing anxiolytic agents, antidepressant drugs, or nicotine replacement therapy for smoking cessation. Furthermore, pediatricians mentioned that they were not reimbursed for their efforts.

Smoking cessation counseling was described as time-consuming. Pediatricians also felt pressured to focus only on "urgent" issues as opposed to chronic issues like tobacco use. Other barriers included poor documentation of previous efforts at counseling and a lack of community resources or clinics to which they could refer parents.

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**Table 1. Demographic Characteristics of Participants**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group 1 (n = 8)</th>
<th>Group 2 (n = 8)</th>
<th>Group 3 (n = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of graduation from medical school, median</td>
<td>1990</td>
<td>1971</td>
<td>1961</td>
</tr>
<tr>
<td>Self-reported knowledge of guidelines, mean*</td>
<td>3.8</td>
<td>3.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Participants with faculty or adjunct appointments at a medical school or residency program, No.</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Participants who were board certified in pediatrics, No.</td>
<td>5</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Patients with asthma followed up by each participant, mean No.</td>
<td>53</td>
<td>61</td>
<td>21</td>
</tr>
<tr>
<td>Participants with a fixed salary, No.</td>
<td>3</td>
<td>8</td>
<td>4†</td>
</tr>
</tbody>
</table>

*1 indicates not knowledgeable; 5, very knowledgeable.
† One participant did not respond.

**Table 2. Focus Group Questions**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Specific Focus Group Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidelines in general</td>
<td>What barriers might prevent the successful use of the 1997 National Heart, Lung, and Blood Institute asthma guidelines?</td>
</tr>
<tr>
<td>Prescription of inhaled corticosteroids</td>
<td>The 1997 asthma guidelines state that a patient with daily asthma symptoms should be taking a daily inhaled corticosteroid. Based on your experience, what are the reasons a physician would not pursue this particular recommendation?</td>
</tr>
<tr>
<td>Recommendation of daily peak flowmeter use</td>
<td>The 1997 asthma guidelines state that a patient with daily asthma symptoms should have a peak flowmeter at home and monitor peak flow every day. Based on your experience, what are the reasons a physician would not pursue this particular recommendation?</td>
</tr>
<tr>
<td>Smoking cessation screening and counseling</td>
<td>The 1997 asthma guidelines state that patients with asthma should not smoke or be exposed to smoke at home. Based on your experience, what are the reasons a physician would not inquiere about smoking status or pursue smoking cessation counseling?</td>
</tr>
<tr>
<td>Allergen control counseling</td>
<td>The 1997 asthma guidelines state that if a patient with asthma has symptoms triggered by an allergen, that allergen should be removed from the home. Based on your experience, what are the reasons a physician would not pursue this recommendation?</td>
</tr>
</tbody>
</table>
Pediatricians described poor outcome expectancy and frustration by poor success at counseling. In addition, other family members at a patient’s home who smoke and are not interested in smoking cessation may continue to expose patients to tobacco smoke. Even if cessation is successful, physicians mentioned other sources of chemical irritants (eg, wood-burning stoves), so the overall effect on a patient’s asthma may be negligible.

Poor outcome expectancy may be related to guideline recommendations that are contrary with the cultural norms of a segment of the patient population. “Where I practice, our minority groups are Native Americans and it is the norm in their society to smoke.” In this case, it was believed that even well-conducted smoking cessation counseling could not overcome this norm.

**BARRIERS TO ALLERGEN EXPOSURE COUNSELING**

Barriers to allergen exposure counseling were associated with lack of agreement, lack of self-efficacy, and lack of outcome expectancy (Table 6).

Some physicians disagreed with the effectiveness of interventions and the application of the guidelines to all patients.

Physicians also reported poor self-efficacy in discussing difficult and sensitive subjects such as limiting

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**Table 3. Internal Barriers, Sample Comments, and External Barriers Associated With Prescription of Daily Inhaled Corticosteroids**

<table>
<thead>
<tr>
<th>Internal Barrier</th>
<th>Sample Comment</th>
<th>Associated External Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of awareness</td>
<td>...</td>
<td>Lack of awareness...</td>
</tr>
<tr>
<td>Lack of familiarity</td>
<td>“You need [an expert] to sort of break it down for you, if you have not used it in a long time...”</td>
<td></td>
</tr>
<tr>
<td>Lack of agreement</td>
<td>“You know, everybody says there are no problems with inhaled steroids. I’m not so sure about that. I mean, we just don’t have the experience.”</td>
<td></td>
</tr>
<tr>
<td>Lack of self-efficacy</td>
<td>“I can agree with the data, but what I wanted was somebody to help me understand what to do about dosing. How high can you push it before you are worried about systemic effects? What is the safest dose? When is it time to see the pulmonologist when it doesn’t work?”</td>
<td></td>
</tr>
<tr>
<td>Lack of outcome expectancy</td>
<td>“Inhaled steroids are a wonderful drug. But I think patient utilization of those drugs is a real problem—no matter how experienced a nurse educator is or you are in demonstrating to the school-age child how to use an inhaler.”</td>
<td></td>
</tr>
<tr>
<td>Inertia of previous practice</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

* Ellipses indicate not applicable.

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**Table 4. Internal Barriers, Sample Comments, and External Barriers Associated With Recommending Daily Peak Flowmeter Use**

<table>
<thead>
<tr>
<th>Internal Barrier</th>
<th>Sample Comment</th>
<th>Associated External Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of awareness</td>
<td>...</td>
<td>Lack of awareness...</td>
</tr>
<tr>
<td>Lack of familiarity</td>
<td>“So when you do the peak flow, what does the number mean when the patient is doing it at home? ... After exercising? ... When they wake up? ... So I have found it not very helpful.”</td>
<td></td>
</tr>
<tr>
<td>Lack of agreement</td>
<td>“But that [peak flowmeters] was not part of the training. I don’t care if that is the guideline, but it is not something that we grew up with, like some people coming out of programs where that is something that they did routinely on the ward.”</td>
<td></td>
</tr>
<tr>
<td>Lack of self-efficacy</td>
<td>“Peak flowmeters, in terms of compliance for use—isn’t really used. We don’t know where it really goes after we give it to them.”</td>
<td></td>
</tr>
<tr>
<td>Lack of outcome expectancy</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Inertia of previous practice</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

* Ellipses indicate not applicable.
exposure to house pets. This process was more difficult by the lack of time to counsel. “In managed care there’s
time constraints. Every 10 minutes you have to see a pa-
tient. You don’t have much time really to sit with a pa-
tient and talk about these things.”

Physicians also reported poor outcome expectancy
because of poor compliance and resistance to giving up
a family pet. “I think there is greater resistance to giving
up a pet than making the home smoke free.” As a result,
you have to choose your battles carefully and pick what
will most likely work.” If families lived in rented hous-
ing, they could not always comply with recommenda-
tions such as removing wall-to-wall carpeting. In addi-
tion, many families did not have adequate insurance
coverage or could not afford recommended inter-
ventions.

### BARRIERS TO ADHERENCE

TO THE GUIDELINES IN GENERAL

Physicians mentioned barriers not specific to a particu-
lar recommendation but in reference to the guidelines
in general (Table 7). These barriers were associated
with all the internal barriers.

Lack of awareness was associated with lack of time
to stay informed and poor guidelines distribution. Phy-
sicians suggested distribution to hospital libraries,
emergency departments, and community hospitals. Dis-
tribution through pharmaceutical representatives was
viewed with suspicion. “Right now I feel that I am at
the mercy of the drug reps, and they have their own
little agenda. It’s horrible. That’s where the information
is coming from.”

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**Table 5. Internal Barriers, Sample Comments, and External Barriers Associated With Smoking Cessation Counseling**

<table>
<thead>
<tr>
<th>Internal Barrier</th>
<th>Sample Comment</th>
<th>Associated External Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of awareness</td>
<td>...</td>
<td>Lack of training in counseling cessation, in finding a nonjudgmental approach, and in prescribing anxiolytic agents</td>
</tr>
<tr>
<td>Lack of familiarity</td>
<td>...</td>
<td>Lack of personal experience in trying to quit smoking</td>
</tr>
<tr>
<td>Lack of agreement</td>
<td>...</td>
<td>Lack of time to properly counsel and to address chronic “urgent” issues</td>
</tr>
<tr>
<td>Lack of self-efficacy</td>
<td>“There is also a pressure for time. The counseling takes time and rapport and I think you really need to make a connection because you are talking about a lifestyle change. That doesn’t happen quickly.”</td>
<td>Lack of documentation of counseling for follow-up, Lack of resources—smoking cessation clinics or community resources to refer to</td>
</tr>
<tr>
<td>Lack of outcome</td>
<td>“One of my partners is very big on smoking cessation, and I suspect that he aggravates half of the people that he talks to about it. Every time that he does I am reminded of the old adage that says, ‘Never attempt to teach a pig to play a musical instrument.’ It tends to annoy the pig and waste your time.”</td>
<td>Noncompliance, Lack of insurance coverage for smoking cessation medication</td>
</tr>
<tr>
<td></td>
<td>expectancy</td>
<td>Patient noncompliance, Patients will still be exposed to other smokers and other irritants at home</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cultural norm—smoking is the norm in some cultures</td>
</tr>
<tr>
<td></td>
<td>Inertia of previous practice</td>
<td>...</td>
</tr>
</tbody>
</table>

*Ellipses indicate not applicable.

**Table 6. Internal Barriers, Sample Comments, and External Barriers Associated With Allergen Exposure Counseling**

<table>
<thead>
<tr>
<th>Internal Barrier</th>
<th>Sample Comment</th>
<th>Associated External Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of awareness</td>
<td>...</td>
<td>Disagreement with effectiveness</td>
</tr>
<tr>
<td>Lack of familiarity</td>
<td>...</td>
<td>Disagreement with indications—not applicable to patients, more important priorities to address</td>
</tr>
<tr>
<td>Lack of agreement</td>
<td>“I think if you survey your colleagues, not everybody would necessarily think that mattress covers help.”</td>
<td>Lack of time to properly counsel because of managed care constraints</td>
</tr>
<tr>
<td>Lack of self-efficacy</td>
<td>“In managed care there’s time constraints. Every 10 minutes you have to see a patient. You don’t have much time really to sit with a patient and talk about these things.”</td>
<td>Lack of ability to counsel and address sensitive subjects</td>
</tr>
<tr>
<td>Lack of outcome</td>
<td>“It is not that I don’t believe in mattress covers. I do. But it is not going to happen.”</td>
<td>Family resistance to giving up family pet, Patients cannot afford interventions—lack of insurance coverage for interventions, Patients do not have control over environment—families live in rental property, Patients will still be exposed to other allergens at home</td>
</tr>
<tr>
<td></td>
<td>expectancy</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>Inertia of previous practice</td>
<td>...</td>
</tr>
</tbody>
</table>

*Ellipses indicate not applicable.*
Although physicians were aware of the guidelines' existence, they were not necessarily familiar with all recommendations. Poor presentation may have added to a lack of physician familiarity because the guidelines were described as tedious, repetitive, confusing, and unclear.

Physicians disagreed with the categories used to describe patients, the timeliness of therapeutic recommendations, and the guidelines' stepwise and simplistic nature. Barriers associated with self-efficacy, ie, confidence in the ability to carry out recommendations, included difficulty in applying guideline categories, lack of time and reimbursement for following recommendations, and lack of continuity for follow-up.

Outcome expectancy is the belief that performing a recommendation will have an effect. If physicians have low outcome expectancy, they will be less likely to perform a recommendation. Associated barriers included patient noncompliance, denial, lack of understanding, and lack of patient appreciation for preventive care.

When the guidelines suggested modifying current practice, physicians also mentioned inertia as a barrier. Some physicians preferred gradual changes or needed to “test” recommendations before consistently following them. If patients were already doing well, physicians were resistant to changing current practice.

### Table 7. Internal Barriers, Sample Comments, and External Barriers From General Comments About NHLBI Asthma Guidelines

<table>
<thead>
<tr>
<th>Internal Barrier</th>
<th>Sample Comment</th>
<th>Associated External Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of awareness</td>
<td>“Using it was definitely hampered by the fact that I did not see it until about 2 weeks ago. So, I don’t know if anybody else got one. [addresses group] Did anyone else get one or see it before? Did anyone else get it?”</td>
<td>Poor distribution of guidelines—not distributed to emergency departments, community hospitals, and hospital libraries Lack of time to stay informed</td>
</tr>
<tr>
<td>Lack of familiarity</td>
<td>“I had it, but I hadn’t really looked at it. You sort of looked at it, but you really didn’t look over it.”</td>
<td>Poor distribution of guidelines—difficult to obtain from National Institutes of Health and not available at local library Lack of access to experts or specialists who are knowledgeable about the guidelines, not incorporated in grand rounds or medical society meetings Lack of time to stay informed Guidelines poorly presented—not clear, confusing, thick and cumbersome, repetitive, and tedious</td>
</tr>
<tr>
<td>Lack of agreement</td>
<td>“There are discrepancies in the publication vs new modalities or treatments. It’s not caught up with actual practice. It’s the same as buying a textbook—4 years later—already out-of-date.”</td>
<td>Disagreement with categories—not applicable to patient population, do not capture diversity of population, not practical to use Recommendations not up-to-date Recommendations too stepwise and too cookbook Difficulty using guideline categories Lack of time to perform recommendations and to educate patients, parents, and staff Lack of reimbursement No continuity of care for follow-up</td>
</tr>
<tr>
<td>Lack of self-efficacy</td>
<td>“It depends on the time that you have available which would make a difference. You cannot spend a half hour. A lot of times you want to. You get them in. You get them out.”</td>
<td>Patient noncompliance Patient lack of understanding—use of medications, ability to use handouts Parents, and patients' lack of appreciation of preventive care—reliance on emergency department Parent and patient denial that child has a chronic disease (asthma), that the child is affected by environment, and that symptoms are present</td>
</tr>
<tr>
<td>Lack of outcome expectancy</td>
<td>“I think you have to prioritize though… I try to talk about the different things that I am supposed to talk about, but you have to target what you think they are going to be able to do.”</td>
<td>Need to test to see if recommendation is beneficial first Loathe to change practice if patient is doing well Preference for gradual changes—would rather not make sudden changes.</td>
</tr>
<tr>
<td>Inertia of previous practice</td>
<td>“One of the barriers overall is the inertia on the part of the physicians to continue to do things the way they have always done it and to be somewhat resistant to change techniques.”</td>
<td>Poor distribution of guidelines—not distributed to emergency departments, community hospitals, and hospital libraries Lack of time to stay informed</td>
</tr>
</tbody>
</table>

* NHLBI indicates National Heart, Lung, and Blood Institute.

**DIFFERENCES AMONG PHYSICIAN AGE GROUPS**

The groups were organized according to year of graduation from medical school. Senior physicians emphasized barriers different from those mentioned by younger colleagues. For example, only senior physicians noted inertia of previous practice as a barrier to adherence.

For corticosteroid prescription, senior physicians mentioned lack of agreement owing to concern about adverse effects, whereas younger physicians described lack of self-efficacy, including less confidence in their ability to determine dosing for corticosteroids or recognize contraindications.

For recommending PFM use, only senior physicians described lack of self-efficacy owing to lack of training and lack of confidence in their ability to interpret readings.

For smoking cessation counseling, younger physicians mentioned barriers associated with lack of training, whereas senior physicians emphasized barriers associated with lack of outcome expectancy owing to patient noncompliance.

For allergen control counseling, all groups mentioned similar barriers. All groups also mentioned barriers related to “time pressures” for all guideline recommendations.
We identified a range of barriers that physicians face when using the NHLBI asthma guidelines. Different types of barriers were prominent for different recommendations from the same guideline. In addition, different types of barriers were prominent for different groups of physicians. Identification of these barriers and an understanding of how recommendation and physician characteristics affect barriers can suggest interventions to improve adherence.

**INTERNAL AND EXTERNAL BARRIERS TO ADHERENCE**

As in previous studies, we document barriers such as lack of awareness and lack of agreement. However, we are also the first to report additional sources of poor adherence to the NHLBI guidelines, such as lack of self-efficacy, lack of outcome expectancy, and inertia of previous practice, that have not been examined previously.

According to social cognitive theory, self-efficacy is the belief that one can actually execute a behavior, whereas outcome expectancy is the belief that a behavior will lead to a particular consequence. Both factors affect whether a behavior (ie, adhering to guidelines) will be initiated and are associated with preventive health education and counseling. Results of this study confirm that these barriers (ie, low self-efficacy in using PFMs and low outcome expectancy in the effectiveness of smoking cessation counseling) also affect NHLBI guideline adherence. This study also confirms the importance of barriers associated with the inertia of previous practice (ie, physician habit), as described with other guidelines.

By not considering this variety of barriers, interventions may be overlooked, such as incorporating in-depth skills training into CME to improve self-efficacy, using audit and feedback by respective peers to overcome inertia of previous practice, and provision of nurse educators to address time limitations. With multiple barriers, a comprehensive strategy with multiple interventions may be necessary.

Low outcome expectancy may be caused by physician inability to discern counseling success at a population level. For example, physicians voiced frustration at the low success rate of smoking cessation counseling. Although consistent smoking cessation counseling may increase a population's quit rate from only 3% to 5%, even this small change is enormously beneficial. Because physicians see patients one at a time and may not be cognizant of practicewise results, feedback of population-level success rates may improve outcome expectancy and subsequent adherence.

Interventions to address low outcome expectancy could also focus on the associated external barrier. For example, low patient compliance was associated with low physician outcome expectancy. Targeted education programs for patients and parents have been effective in improving asthma self-management. Office-based interventions can also improve patient compliance. Improving patient compliance has a direct effect on patient outcomes. In addition, by addressing physician perceptions of low outcome expectancy owing to poor patient compliance, physicians may be more enthusiastic about adhering to NHLBI guidelines.

Although lack of awareness and lack of familiarity are previously described barriers to adherence, there were unique themes to the NHLBI guidelines.

Although guideline dissemination via pharmaceutical representatives increases availability, physicians viewed any information from such sources with suspicion. Physicians preferred receiving information from “neutral” sources such as CME conferences or libraries, or directly from the NHLBI.

Direct mailing from the National Institutes of Health of its consensus statement on osteoporosis was effective in improving physician awareness in a controlled trial. The use of clinical alerts by the National Institutes of Health has also been effective in disseminating new information and changing physician practice. Interventions using local opinion leaders to improve awareness and familiarity might also be effective and credible.

Guideline presentation, which affected familiarity, must balance 2 possibly competing concerns. Some comments suggested brevity because the guidelines were described as repetitious, dense, and lengthy. These comments are similar to results of other studies. For example, in a case study, physicians transformed a “research literature” orientation to a more “clinical decision-oriented” document for local use. In another study, physicians at an academic hospital preferred the use of “algorithms with treatment-specific information that is placed on the front of a patient chart.” However, in our study, physicians also described the NHLBI guidelines as too simplistic or cookbook and unable to handle the complex realities of everyday practice. The use of multiple formats, ie, concise, clinical-oriented summaries with references to more detailed explanations, might accommodate the different needs of different physicians.

Results of this study also confirm disagreement as a barrier to adherence. However, with respect to corticosteroid recommendations, disagreement was associated with senior pediatricians.

Local medical communities can be relatively closed systems, where changes in an individual's practice are primarily affected by local colleagues and consensus. Opinion leaders are members of a local medical community who influence the acceptance of an innovation, such as a guideline, by that community. As a result, interventions that target these persons may be effective in helping shape local consensus or agreement about a guideline.

In addition to interventions targeted toward opinion leaders, physician participation in guideline development may be useful in addressing barriers owing to lack of agreement. Anecdotally, physician participation in guideline development has been associated with increased guideline acceptance. Guideline endorsement by a physician's own specialty organization has also been associated with improved physician confidence in a guideline.
RECOMMENDATION AND PHYSICIAN CHARACTERISTICS

A single clinical practice guideline is a collection of many systematically developed statements or recommendations. Previous studies that examined pediatric guideline adherence have generalized barriers from a single guideline to each of its recommendations. This study suggests that specific recommendations within the NHLBI guidelines have a different set of barriers. For example, although lack of agreement is a barrier to corticosteroid prescription, it is not an issue for smoking cessation counseling. Despite being within the same guideline, different recommendations may demand different types of interventions.

Previous studies also have not considered physician demographics. This study suggests that at least one physician characteristic-years since graduation from medical school—is related to barriers to adherence.

LIMITATIONS

Although focus groups are helpful in describing participants’ perceptions of abstract concepts such as barriers to guideline adherence or understanding complex behavior such as physician practice, the results are difficult to quantify. In addition, these individual perceptions may not include insight at a peer group or community level. Other methods, such as physician surveys, are useful in quantifying the prevalence and intensity of these barriers and in identifying larger patterns of barriers owing to geographic variation in implementation.

Physicians may not be aware of or sensitive to all the barriers that affect adherence. For example, a barrier described by a physician as parental disinterest in educational materials might actually be poor patient health literacy or poor physician cultural competency.

This study’s generalizability is also limited by how participants were selected. Volunteers were recruited from a 1-week CME conference and may represent practices that are more affluent or conscious of staying up-to-date. The sessions were also conducted at an academic setting, which may influence participants to give “correct” or “professionally acceptable” responses. Finally, the data are based on physician perception of barriers, which may be actual or perceived and thus affect the type of intervention needed to overcome the barrier.

IMPLICATIONS

Our results suggest implications for interventions to improve adherence to the NHLBI guidelines. Efforts to improve adherence should consider the range of barriers besides lack of awareness or agreement. This study documents barriers not considered in previous studies, such as lack of self-efficacy, lack of outcome expectancy, and inertia of previous practice, that prevent adherence. These barriers may require tailored interventions such as CME with skills training (to improve self-efficacy), practice audit and feedback by peers (to overcome inertia of previous practice), or feedback of population-level successes (to improve outcome expectancy).

Suggestions to improve awareness of the NHLBI guidelines include improved distribution using “neutral” sources such as CME, libraries, or the NHLBI directly. Physicians commented that poor familiarity was associated with poor guideline presentation.

Finally, different recommendations within the same guideline have different barriers. Physician year of graduation from medical school is also associated with different barriers. For example, although lack of agreement prevents physician adherence to recommendations for daily inhaled corticosteroid prescription, it was most associated with senior physicians. As a result, efforts to improve adherence should be tailored to the specific guideline recommendation and to physician characteristics.

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