

How to uncover cause of refractory asthma

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Amanda is a 13-year-old with a history of moderate persistent asthma, diagnosed when she was 7 years old. She was started on inhaled corticosteroids but continues to have significant nighttime cough and exercise intolerance, despite escalating doses. What is the next step?

When evaluating a child who is not responding to typical asthma therapy, the following questions should be considered. Is this truly asthma? Is the child even taking the medication? Is the child taking the medication correctly? Have all avoidable environmental triggers been addressed? Does asthma severity require escalation to more intensive therapies, including biologic therapy?

Consider other diagnoses

If a child is not responding to conventional asthma medication therapy, it is important to consider alternative diagnoses. Masqueraders of asthma could include vocal cord dysfunction, protracted bacterial bronchitis, gastroesophageal reflux disease, habit cough, allergic bronchopulmonary aspergillosis and a number of other, more serious etiologies. Pre- and post-bronchodilator spirometry and exercise and methacholine provocation challenges can be very helpful in determining the diagnosis.

Track medication adherence

Adherence to medications is a challenge in the treatment of any chronic medical condition, and asthma is no exception.

AAP News photo by Jeff Knox

Traditional methods of tracking medication adherence have included recall and pharmacy fill evaluations in the clinical setting, and diaries and weighing inhalers in the research setting, all of which have significant pitfalls. Patients are likely to overestimate their adherence to prescribed medical therapies for any number of reasons.

New technologies are being adopted to improve physician and patient understanding of medication adherence. Platforms include adherence trackers linked via Bluetooth to the patient's smartphone, which track both controller and rescue medication use and can utilize GPS tracking to determine where rescue medication is used most frequently. Some platforms also link home spirometry data through a separate device, so patients can track lung function electronically and recognize early decline. The use of these types of devices is growing rapidly and likely will be in use in many clinical practices soon (Chan AH, et al. *J Allergy Clin Immunol Pract.* 2015;3:335-349).



It would not be unreasonable to suspect that inhaled medications may be manufactured with the ability to track usage in the not-so-distant future.

Assess inhaler technique

Evaluation of inhaler technique is another key element in assessing therapeutic failures. Proper inhalation technique and the use of a spacer are key to ensuring adequate medication delivery. Studies have shown that baseline inhaler technique is poor (Capanoglu M, et al. *J Asthma*. 2015;52:838-845). Additionally, families may have expectations that younger children can use their inhalers correctly when unsupervised, which may not be the case.

Teaching proper inhaler technique is a key but time-consuming method of ensuring adequate medication delivery. Strategies to educate patients in a busy clinic setting include videos demonstrating proper technique and training ancillary staff interested in asthma education.

Look for environmental triggers

Allergy testing and assessment of environmental triggers are important in the management of a refractory asthmatic, paying particular attention to avoidance of exposures such as tobacco smoke.

Escalate care

If a diagnosis of asthma is confirmed and technique and adherence have been determined to be adequate, then escalation of care per asthma care guidelines is the next appropriate step (Global Strategy for Asthma Management and Prevention, <http://bit.ly/2a5yu1w>). Referral to a pediatric asthma specialist should be considered as well.

Some patients may require a step up to biologic therapies to control asthma. Biologic therapies used in pediatric patients include omalizumab, an anti-IgE antibody that has been shown to reduce exacerbations in children ages 6 and older with severe asthma. Mepolizumab is an anti-IL-5 antibody used in children 12 years of age and older with eosinophilic asthma. Numerous other immunomodulatory drugs for the treatment of severe asthma also are in the pipeline.

Amanda demonstrated appropriate technique, but it was determined that her adherence to medications was very poor. Her pediatrician continues to work with her on modifying her behavior to ensure that she takes her medication appropriately and gets her asthma under control.

Dr. Hoch is a member of the AAP Section on Pediatric Pulmonology and Sleep Medicine Executive Committee.