

Environmental Management of Pediatric Asthma

Asthma is an inflammatory disorder of the airways, causing attacks of wheezing, shortness of breath, chest tightness, and coughing. Though asthma is a chronic condition, airway obstruction is reversible. Pediatric asthma is the **most prevalent chronic childhood medical condition**, affecting 7.1 million U.S children annually.¹ Low income and minority children are more likely to suffer from asthma and less likely to receive treatment.

Environmental management of pediatric asthma involves **minimizing asthma symptoms by reducing a child's exposure to allergens** in the home and other places he/she spends time. Environmental management should supplement traditional medical care, such as inhaled steroids, written asthma action plans, and periodic asthma check-ups. One asthma study conducted with 937 urban children found that **reducing patient-specific asthma triggers can give children up to 38 more symptom-free days** for less than \$30 per symptom-free day.² Lower levels of allergens in the home persisted through the second, follow-up year of the study.

Despite these benefits, the U.S. Environmental Protection Agency's 2004 National Survey on Environmental Management of Asthma found that **less than 30% of people with asthma are taking all the essential actions recommended to reduce exposure** to indoor environmental asthma triggers. More shockingly, children with asthma were just as likely to be exposed to environmental tobacco smoke (ETS). **Education is crucial** to improve these outcomes. Patients who see allergists do have greater knowledge of environmental allergens, showing the need for pediatricians to focus more on environmental management.³

Successful strategies for managing asthma triggers

In 2000, the Institute of Medicine identified common asthma triggers in their "Clearing the Air" report. Follow-up research has monitored the success of various intervention strategies.

Sufficient evidence of causal relationship	Sufficient evidence of an association	Limited evidence of association
<ul style="list-style-type: none">• Cats• Cockroaches• ETS (preschoolers)• Dust mites	<ul style="list-style-type: none">• Dogs• Mold• Oxides of nitrogen	<ul style="list-style-type: none">• Formaldehyde• Fragrances• ETS (older children)

Committee on the Assessment of Asthma and Indoor Air; Division of Health Promotion and Disease Prevention; Institute of Medicine, 2000.

Dust mite interventions: Allergen impermeable casings for bedding, when combined with immunotherapy, provide additional improvement in symptoms.⁴



Cat and dog antigen interventions: HEPA filters reduce antigen burden and nocturnal symptoms but have no other significant impact on disease activity.⁵

Mouse antigen interventions: The best strategy is integrated pest management, which begins with the least toxic pest control methods: mousetraps, sealing holes, resident education, plastic food storage containers, generalized cleaning, and strategic placements of bait or gel traps.⁶



Cockroach antigen interventions: Integrated pest management remains the best strategy, with low-toxicity bait traps working better than home exterminations.^{6, 7}

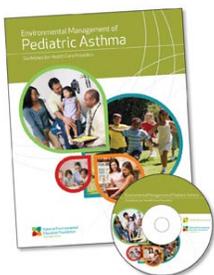
Mold interventions:

Educating residents to prevent mold and remediating existing mold are both helpful.⁸

Many guidelines are available

- National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (440 pages): <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>
- Guidelines Implementation Panel Report for Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (52 pages): http://www.nhlbi.nih.gov/guidelines/asthma/gip_rpt.pdf
- Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers (for children ages 0-18 already diagnosed with asthma): <http://www.neefusa.org/health/asthma/asthmaguidelines.htm>

GIP Report: 6 Priority Messages	
1	Use inhaled corticosteroids
2	Use a written asthma action plan
3	Assess asthma severity
4	Assess and monitor asthma control
5	Schedule periodic asthma visits
6	Control environmental exposures



- Built upon scientific literature and current best practices, this free guide includes educational competencies, an environmental history form, intervention guidelines, sample patient flyers & references, and additional online resources.
- The guidelines propose a two visit concept—a short introduction followed by additional in-depth questions to explore exposure sources & parents' current practices. The table on the following page highlights some of the guide's questions and recommendations. In the case of more expensive interventions, the specific allergen should first be confirmed via skin test. Low-cost interventions— HEPA filters, mattress covers, etc.—are reasonable without a proven allergy.



Diagnostic Questions and Recommended Interventions for Common Asthma Triggers

<p>Dust mites are microscopic insects that live off of fabric items and feed on shed flakes of skin. They thrive in warm, humid environments. Their body parts & feces can trigger asthma.</p>	<ul style="list-style-type: none"> - Is your child's asthma worse at night? - Does dust exposure make it worse? - Does your child sleep with stuffed animals? - Is there wall-to-wall carpet in your child's bedroom? 	<ul style="list-style-type: none"> - Encase all pillows/mattresses in dust covers - Wash bedding & stuffed toys weekly in 130°F water - Use a HEPA vacuum cleaner - Avoid humidifiers - If allergy is proven by a skin test, replace draperies with blinds, remove carpet, remove upholstered furniture
<p>Animal allergens are caused by proteins from saliva or oil glands, which are shed as dander. Dander is carried on small particles and can persist indoors long after the animal is gone.</p>	<ul style="list-style-type: none"> - Do you have any furry pets? - Does your child sleep with the pet? - Has your child's asthma become worse since having the pet? - Do you see evidence of rats or mice in your home weekly? 	<ul style="list-style-type: none"> - Find a new home for indoor pets - Keep pets outside - Keep pets out of the bedroom - Use similar interventions as dust mites - Bath cats at least twice a week - Use least toxic method (baits/traps) to eliminate rats or mice
<p>Cockroach allergens come from the insects' droppings, body parts, and saliva. Cockroaches follow food and water sources, and are often difficult to eradicate.</p>	<ul style="list-style-type: none"> - Do you see cockroaches in your home daily? - Do you see evidence of cockroach droppings? - How do you get rid of cockroaches? - Does your child's school or other places he/she spends time have cockroaches? 	<ul style="list-style-type: none"> - Clean up food, crumbs & spills ASAP - Store food/trash in closed containers - Limit spread of food around house - Fix water leaks under sinks - Mop kitchen floor weekly - Clean counter tops daily - Use least toxic extermination method (baits/gels) - Never use industrial pesticide sprays without consulting a professional
<p>Molds & mildew thrive both indoors (in dark, warm, humid environments like bathrooms, attics, basements, laundry rooms) and outdoors (in moist, shady areas like soil, decaying vegetation, compost piles, rotting wood, fallen leaves).</p>	<ul style="list-style-type: none"> - Do you see or smell mold/mildew in your home? - Is there evidence of water damage in your home? - Do you use a humidifier or swamp cooler? - Do you frequently have condensation on your windows? 	<ul style="list-style-type: none"> - Discard items too moldy to clean - Professional cleaning recommended for areas larger than 3 x 3 ft - Clean small areas with detergent and water - Dilute (1:10 with water) chlorine bleach solution provides cosmetic improvement and kills mold but does not remove allergens and the user should be aware of risks - Don't mix bleach and ammonia! - Be aware of respiratory irritant effect of bleach (asthmatics) - Identify and stop sources of water intrusion
<p>Environmental tobacco smoke is associated with more asthma attacks, lower respiratory infections, and middle ear infections, plus an increased risk of SIDS. Smoking outside is not enough.</p>	<ul style="list-style-type: none"> - Do any family members, caregivers, or friends smoke? - Would they be willing to quit? - Does your child/teenager smoke? - Do you have a no smoking policy in the home? - Does anyone smoke in your child's childcare settings? 	<ul style="list-style-type: none"> - Keep home & car smoke free - Seek support to quit smoking (nicotine, gum, patch, medication from physician) - Choose smoke free childcare and social settings - If you smoke, do not smoke around your child - Refer patients to smoking cessation or community support programs
<p>Indoor air pollution comes from common household products, volatilizing chemicals from building materials (even years after construction), and NO₂ from indoor fuel-burning appliances. Americans spend up to 90% of their time indoors.</p>	<ul style="list-style-type: none"> - Have you had new carpets, paint, refinishing, etc. in the past year? - Does anyone in the home have a hobby that gives off toxic fumes? - Are there other irritants (sprays, perfumes, cleaning agents)? - Do you use a wood burner? - Do you use unvented appliances (e.g., gas stove) for heat? 	<ul style="list-style-type: none"> - Eliminate tobacco smoke - Install outdoor-vented exhaust fans close to sources of contaminants - Properly ventilate room where fuel burning appliance is used - Avoid strong odors and minimize use of irritating products - Use good housekeeping to control particles - Do not heat home with cook stove
<p>Outdoor air pollution comes from fine & ultrafine particles and ozone from industrial sources, diesel exhaust, and pollens. These increase asthma risk, especially with exercise.</p>	<ul style="list-style-type: none"> - Has outdoor air pollution ever made your child's asthma worse? - Do you monitor air quality alerts? - Does your child limit outdoor activity during alerts? - Do you live within 300 yards of a major roadway or highway? - Is your child's asthma worse with a particular change in weather? 	<ul style="list-style-type: none"> - Monitor air quality index levels at http://airnow.gov - Contact health care provider if more albuterol is needed the day after a high AQI level - Tell child to avoid exhaust pipes of idling vehicles - Use HEPA filters in household vents - Use central air conditioning - Avoid swamp coolers during high ozone/pollen conditions

References

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