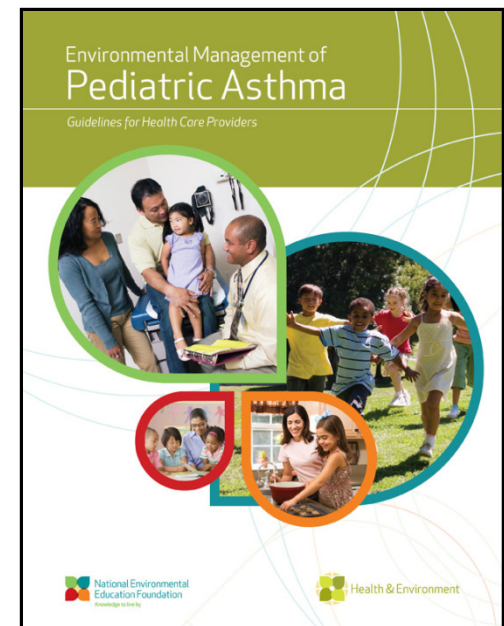


Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers

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Pediatric Asthma

- Most prevalent chronic medical condition in childhood
- 7.1 million (9.6%) US children in 2009¹
 - Low income children more likely to have increased morbidity from asthma²
 - Low income children less likely to receive preventive care²

¹Akinbami LJ, Moorman JE, Liu X. “Asthma Prevalence, Health Care Use, and Mortality: United States, 2005–2009”. National Health Statistics Reports; no 32. Hyattsville, MD: National Center for Health Statistics. 2011.

²Akinbami LJ, Moorman JE, et al. *Pediatrics* 2009: 123; S131-S145

Variation in Asthma Severity by Race/Ethnicity

- African-American and Latino children worse asthma status than comparable white children¹
- African-American children as compared to white children²
 - >2 times as likely to be hospitalized
 - >3 times as likely to die from asthma

¹Bloom B, Cohen RA, Freeman G. Summary health statistics for U.S. children: National Health Interview Survey, 2008. National Center for Health Statistics. Vital Health Stat 10(244). 2009.

²Akinbami LJ, Moorman JE, et al. *Pediatrics* 2009: 123; S131-S145.

Variation in Asthma Care by Race/Ethnicity

- African-American children less likely to have made office visit for asthma (OR 0.77)¹
- African-American and Latino children less likely to use inhaled corticosteroids (OR 0.78 and 0.66 respectively)²

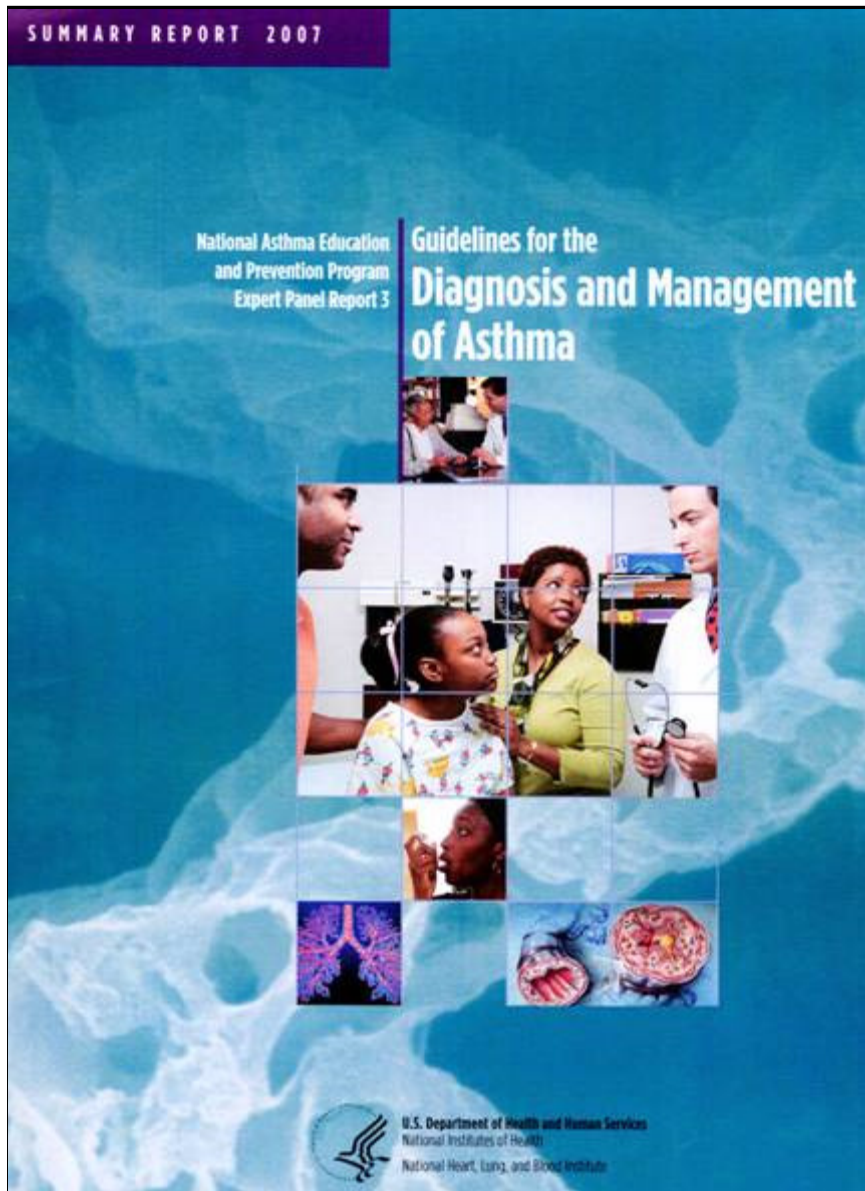
¹Kim H, et al. *Prev Chronic Dis* 2009;6(1):A12

²Crocker et al. *Chest* 2009;136(4):1063-71.

National Survey on Environmental Management of Asthma

Assessed public's knowledge of environmental asthma triggers and their actions to manage environmental triggers.

- People from low income, low education households are more likely to have asthma.
- Less than 30% of people with asthma are taking all the essential actions recommended to reduce their exposure to indoor environmental asthma triggers.
- People with written asthma action plans are more likely to take actions to reduce exposure to environmental asthma triggers; however, only 30% of people with asthma have a written asthma action plan.
- Children with asthma are just as likely to be exposed to ETS in their home as children in general.



National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma

www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

GIP Report: Six Priority Messages

- Use inhaled corticosteroids
- Use a written asthma action plan
- Assess asthma severity
- Assess and monitor asthma control
- Schedule periodic asthma visits
- Control environmental exposures

Message #1: Use Inhaled Corticosteroids

- Inhaled corticosteroids are the most effective medications for persistent asthma
- Well tolerated
 - Small decrease in linear growth, but diminishes over time
- Superior to montelukast alone as preventive agent^{1,2}

¹Rachelefsky G. Pediatrics 2009;123:353-66

²Castro-Rodriguez JA, & Rodrigo GJ. Arch Dis Child 2009;95: 365-70.

Message #2: Use Written Asthma Action Plan

- All medications written in one place
- Based on peak flow monitoring
- Find out predicted based on height
- **Green Zone**: 80% of predicted or more
- **Yellow Zone**: 50-80% of predicted
- **Red Zone**: 50% of predicted or less

Asthma Action Plan

Asthma Action Plan

For: _____ Doctor: _____ Date: _____
 Doctor's Phone Number _____ Hospital/Emergency Department Phone Number _____

GREEN ZONE

Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____ (80 percent or more of my best peak flow)

My best peak flow is: _____

Before exercise _____ 2 or 4 puffs _____ 5 to 60 minutes before exercise

Take these long-term control medicines each day (include an anti-inflammatory).

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____

YELLOW ZONE

Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____ (50 to 79 percent of my best peak flow)

First Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.

_____ 2 or 4 puffs, every 20 minutes for up to 1 hour
(short-acting beta₂-agonist) Nebulizer, once

Second If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:

Continue monitoring to be sure you stay in the green zone.

-Or-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

Take: _____ 2 or 4 puffs or Nebulizer
(short-acting beta₂-agonist)

Add: _____ mg per day For _____ (3–10) days
(oral steroid)

Call the doctor before/ within _____ hours after taking the oral steroid.

RED ZONE

Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____ (50 percent of my best peak flow)

Take this medicine:

_____ 4 or 6 puffs or Nebulizer
(short-acting beta₂-agonist)

_____ mg
(oral steroid)

Then call your doctor NOW. Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

Take 4 or 6 puffs of your quick-relief medicine AND
Go to the hospital or call for an ambulance _____ NOW!
(phone)

DANGER SIGNS

- Trouble walking and talking due to shortness of breath
- Lips or fingernails are blue

See the reverse side for things you can do to avoid your asthma triggers.

How To Control Things That Make Your Asthma Worse

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Then decide with your doctor what steps you will take.

Allergens

Animal Dander

Some people are allergic to the flakes of skin or dried saliva from animals with fur or feathers.

The best thing to do:

- Keep furred or feathered pets out of your home.
- If you can't keep the pet outdoors, then:
- Keep the pet out of your bedroom and other sleeping areas at all times, and keep the door closed.
- Remove carpets and furniture covered with cloth from your home.
- If that is not possible, keep the pet away from fabric-covered furniture and carpets.

Indoor Mold

- Fix leaky faucets, pipes, or other sources of water that have mold around them.
- Clean moldy surfaces with a cleaner that has bleach in it.

Pollen and Outdoor Mold

What to do during your allergy season (when pollen or mold spore counts are high):

- Try to keep your windows closed.
- Stay indoors with windows closed from late morning to afternoon, if you can. Pollen and some mold spore counts are highest at that time.
- Ask your doctor whether you need to take or increase anti-inflammatory medicine before your allergy season starts.

Dust Mites

Many people with asthma are allergic to dust mites. Dust mites are tiny bugs that are found in every home—in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items.

Things that can help:

- Encase your mattress in a special dust-proof cover.
- Encase your pillow in a special dust-proof cover or wash the pillow each week in hot water. Water must be hotter than 130°F to kill the mites. Cold or warm water used with detergent and bleach can also be effective.
- Wash the sheets and blankets on your bed each week in hot water.
- Reduce indoor humidity to below 60 percent (daily between 30–50 percent). Dehumidifiers or central air conditioning can do this.
- Try not to sleep or lie on cloth-covered cushions.
- Remove carpets from your bedroom and those laid on concrete, if you can.
- Keep stuffed toys out of the bed or wash the toys weekly in hot water or cooler water with detergent and bleach.

Cockroaches

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

The best thing to do:

- Keep food and garbage in closed containers. Never leave food out.
- Use poison baits, powders, gels, or paste (for example, boric acid). You can also use traps.
- If a spray is used to kill roaches, stay out of the room until the odor goes away.

Irritants

Tobacco Smoke

- If you smoke, ask your doctor for ways to help you quit. Ask family members to quit smoking, too.
- Do not allow smoking in your home or car.

Smoke, Strong Odors, and Sprays

- If possible, do not use a wood-burning stove, kerosene heater, or fireplace.
- Try to stay away from strong odors and sprays, such as perfume, lacquer powder, hair spray, and paints.

Other things that bring on asthma symptoms in some people include:

Vacuum Cleaning

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you vacuum, use a dust mask (from a hardware store), a double-layered or microfilter vacuum cleaner bag, or a vacuum cleaner with a HEPA filter.

Other Things That Can Make Asthma Worse

- Suffes in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).

For More Information, go to: www.nhlbi.nih.gov

NHL Publication No. 07-5251
April 2007

U.S. Department of Health and Human Services
National Institutes of Health

National Heart Lung and Blood Institute

Message #3: Assess Asthma Severity

- Classify all patients' asthma based on measures of current impairment and future risk
- **Impairment:** Think Rule of 2s
 - Intermittent -- < 2 days/week of symptoms and less than 2 days/week of bronchodilators
 - Persistent– if at least ≥ 2 days/ week of symptoms and bronchodilator use
 - Persistent asthma also includes activity limitations
- **Risk:** # exacerbations requiring oral steroids
 - 0-1/year = Intermittent asthma
 - ≥ 2 /year = Persistent asthma

Message #4: Assess and Monitor Asthma Control

- Well Controlled (regardless of classification)
 - ≤ 2 days/week of symptoms
 - ≤ 1 nighttime awakening/month
 - ≤ 2 days/week of bronchodilator
- Not well controlled
 - > 2 days/week symptoms
 - ≥ 2 nighttime awakenings/month
 - > 2 days/ week of albuterol
- Very Poorly Controlled
 - Daily symptoms and multiple doses of albuterol/day

*No limit in activity indicates good control

Message #5: Schedule Follow-up Visits

- Schedule planned follow-up visits at periodic intervals to assess asthma control and modify treatment if needed
 - 1-6 months depending on control
 - 3 month interval if step down in therapy is anticipated
- Consider a patient reminder system for these visits

Message #6: Control Environmental Exposures

- Review the environmental history of exposures
- Develop a multi-pronged strategy to reduce exposure to those triggers to which a patient is sensitive
- Remainder of presentation focuses on evidence of exposure mediation and recommendations for your patient

Indoor Exposures and Exacerbation of Asthma

- Sufficient evidence of Causal Relationship

Cat	Cockroach	ETS (preschooler)	House dust mite
------------	------------------	------------------------------	----------------------------

- Sufficient evidence of an Association

Dog	Molds	Rhinovirus	NO₂ & NO_x
------------	--------------	-------------------	--

- Limited evidence of Association

Formaldehyde Fragrances	RSV
ETS (school-aged and older children)	

What is the Evidence of Environmental Trigger Control?



Dust Mite Control

- Randomized Controlled Trial (RCT)
 - Group 1-- polyurethane casings for bedding, tannic acid on the carpets
 - Group 2-- Benzyl benzoate on mattresses and carpets at time 0, and 4 & 8 months
 - Group 3-- Placebo foam on the mattresses and carpets at time 0, and 4 & 8 months
- Decreased mite allergen on Group 1 mattresses
- Children of Group 1 with reduced airway reactivity

Dust Mite Control

- Improvements from dust mite encasements¹
 - Reduced dust mite allergen
 - Improved bronchial hyper-responsiveness
- Improved allergen level, but...
 - No improvement in symptoms, medication needs or bronchial hyper-responsiveness²
- Mattress encasement + immunotherapy
 - Encasements alone reduced dust mite concentration
 - Immunotherapy with additional symptomatic improvement

¹Van der Heide S Allergy 1997;52:9121-7

²Frederick JM Eur Respir J 1997;10:361-66.

³Paul K Eur J Pediatrics 1998;157:109-113.

Dust Mite Control

- Danish study in children (n= 60)
 - Allergen impermeable mattress covers
- Significant reduction in dust mite allergen for intervention group
- Significant decrease in effective dose of inhaled steroid by 9 months and by 12 months was half the dose of control group
- No effect on bronchial hyper-responsiveness
- Is comprehensive trigger control a better idea?

Cats Stick with You



- Classrooms with many (>25% of class) cat owners had more cat allergen than other classrooms
- Allergen levels in non-cat owners' clothes increased after one day in that classroom
- Exposure through school can exacerbate asthma in sensitized children even if they don't own a cat

Almqvist C. *J Allergy Clin Immunol* 1999;103:1002-4

Almqvist C et al. *Am J Respir Crit Care Med* 2001;163:694-8

Control of Cat Ag

- RCT with 35 cat-allergic (and owner) subjects
 - High-efficiency particulate arresting (HEPA) air cleaner
 - Mattress and pillow covers
 - Cat exclusion from bedroom
- Reduced airborne cat allergen levels
- No effect on disease activity
- In cat allergic individuals with asthma, intranasal steroids were effective

Wood RA *Am J Respir Crit Care Med* 1998;158:115-20

Wood RA, Eggleston PA. *Am J Respir Crit Care Med* 1995;15:315-20

Control of Cat/Dog Ag

- RCT – 36 subjects sensitized and exposed to cat and/or dog allergen; 30 completed study
- Intervention was HEPA air cleaner **only**
 - Control used a sham air cleaner filter
- Higher concentrations of cat/dog Ag were filtered in the HEPA cleaner than sham filter
 - No change in bulk dust Ag from home samples
- Decrease in nocturnal symptoms
- Trend towards improvement in bronchial hyper-responsiveness, but not significant

Mouse Ag



- Inner city population in Boston
 - 42% had mouse allergen in home¹
 - Associated with black race, reported visible evidence of mice exposure, cockroach allergen
- Potentially greater mouse exposure in school
 - Matched classroom and home samples in 23 asthmatic children²
 - 46 rooms in 4 urban, Northeastern schools
 - Mouse Ag levels significantly higher in school samples v. bedroom samples (6.45 mcg/g v. 0.44 mcg/g)

¹Phipatanakul W, et al. *Allergy* 2005;60:697-701

²Sheehan WJ, et al. *Ann Allergy Asthma Immunol* 2009; 102:125-30.

Mouse Ag



- 18 homes of children with persistent asthma and positive mouse allergen
- Integrated pest management
 - Filled holes
 - Vacuum and cleaning
 - Low-toxicity pesticides and traps
- Mouse allergen levels significantly reduced during 5 month period



Cockroach Ag Control

- Home extermination– 2 applications
 - Abamectin, Avert
- Directed education on cockroach allergen removal
- 50% of families followed cleaning instructions, no greater effect was found in these homes
- At 12 months, allergen had returned to or exceeded baseline levels



Gergen PJ et al. *J allergy Clin Immunol* 1999;103:501-6

Cockroach Ag Control

- Occupant education, professional cleaning
- Insecticide bait
- Substantial reductions in cockroach allergy levels achieved¹
- Second Study– Professional cleaning
 - Bait traps with insecticide
 - Bait traps without insecticide
 - Significant reduction in cockroach allergen²

¹Arbes SJ et al. *J Allergy Clin Immunol* 2003;112:339-45

²McConnell R et al. *Ann Allergy Asthma Immunol* 2003;91:546-52

Integrated Pest Management

- Pest control strategy that involves “least toxic methods first”
- Strategies vary, but often may include:
 - Mousetraps
 - Sealing cracks/ small holes
 - Resident education
 - Plastic food storage containers
 - Generalized cleaning
- Strategic placement of pest control treatments, often in the form of bait traps or gels

Integrated Pest Management Boston Public Housing

- 39 apartments among 3 public housing buildings
- IPM as described in prior slide
- Dust collection sampling for cockroach antigen
 - Bedding (including mattress and pillows)
 - Kitchen cupboards under sink and kitchen floor
- Reduction in cockroach antigens (Blot 1, Blot 2)
 - Kitchen-- 71% and 86% by 6 months
 - Bed-- 53% and 70% by 6 months
- Decline was not sustained beyond 6 months
- No clinical correlation

Integrated Pest Management

New York City Public Housing (NYCPH)

- Randomized 13 buildings to either IPM or Control groups
 - Trained public housing resident to become IPM technician for their building
 - IPM as described above
 - No scheduled visits, but solid or gel baits applied if needed
- Control group received standard NYCPH pest control on a scheduled basis
 - Baseboard spraying with pyrethroid insecticide
- IPM group had significantly lower cockroach counts
 - Noticed by 3 months, sustained through 6 months
- IPM group with lower cockroach allergen levels
 - Kitchen by 3 months,
 - Beds by 6 months

Mold Control

RCT – 62 patients



- Pre-remediation period-- ~120 days
 - Before randomization, all received information on improving indoor air quality, home fungal sampling, and spirometry
 - Both groups had decrease in number of asthma symptomatic days
- Post remediation (Remediation Group)
 - Remediation group had significant decrease in mold levels, persisting through 12 months ($p = 0.009$)
 - Decrease in symptom days for remediation ($p = 0.003$)
 - No further change in symptom days in control group
 - Remediation group with lower rate of exacerbations compared to control group
 - 1 of 29 v. 11 of 33; $p = 0.003$

The Community Guide: Asthma Control Centers for Disease Control & Prevention

- Systematic review of available studies
- Findings: Strong evidence of effectiveness in reducing symptom days, improving quality of life or symptom scores, and in reducing the number of school days missed
- Recommendations: Use of home-based, **multi-trigger, multicomponent interventions** with an environmental focus for children and adolescents with asthma

CDC Task Force Findings and Rationale Statement Interventions for Children and Adolescents with Asthma www.thecommunityguide.org/asthma/rrchildren.html

Last updated: 6/15/2010

Combined Asthma Trigger Management

- Patients can be sensitive and exposed to numerous triggers
- RCT-- 100 subjects
- Treatment group received
 - Home-based education
 - Roach and Rodent extermination
 - Mattress and pillow encasings
 - HEPA cleaner
- Control group did get treatment at end of 12 month period

Combined Asthma Trigger Management

- 84% received cockroach extermination
- 75% used the HEPA cleaner
- 39% decline in PM10 levels in treatment group
 - Increase in the control group ($p < 0.001$)
- 52% decrease in cockroach allergens in treatment group
- Decrease in daytime symptoms in treatment group
 - Increased in control group ($p = 0.04$)

Inner City Asthma Study

- Evaluates multiple trigger management
- 937 urban children with asthma
 - 1 year of intervention, 1 additional year of follow up
- Evaluation --questionnaire and skin testing
- Home sampling --dust, cockroach, cat and dog allergen
- Interventions aimed at patient-specific triggers
 - Allergen impermeable mattress and pillow covers
 - HEPA air filters and vacuum cleaners
 - Professional pest control

Szefer SJ et al. *J Allergy Clin Immunol* 2010;125:521-6
Morgan WJ, et al. *New Engl J Med* 2004;351:1068-80

Inner City Asthma Study

Results and Cost Effectiveness

- Fewer days with symptoms¹
- Greater decline in level of allergens at home²
 - Persisted through 2nd “follow up” year
 - Dust and cockroach Ag correlated with fewer complications of asthma
- Cost Effectiveness analysis³
 - 38 more symptom free days
 - Under \$30 per symptom free day

^{1,2}Morgan WJ, et al. *New Engl J Med* 2004;351:1068-80

³Kattan M, et al. *J allergy Clin Immunol* 2005;116:1058-63

Evidence for Outdoor Air Triggers

Reducing Traffic:1996 Atlanta Olympics

- The Intervention:
 - Around-the-clock public transportation
 - 1,000 buses added
 - Downtown city streets closed to private cars
 - Downtown delivery schedules altered
 - Flexible and telecommuting work schedules encouraged

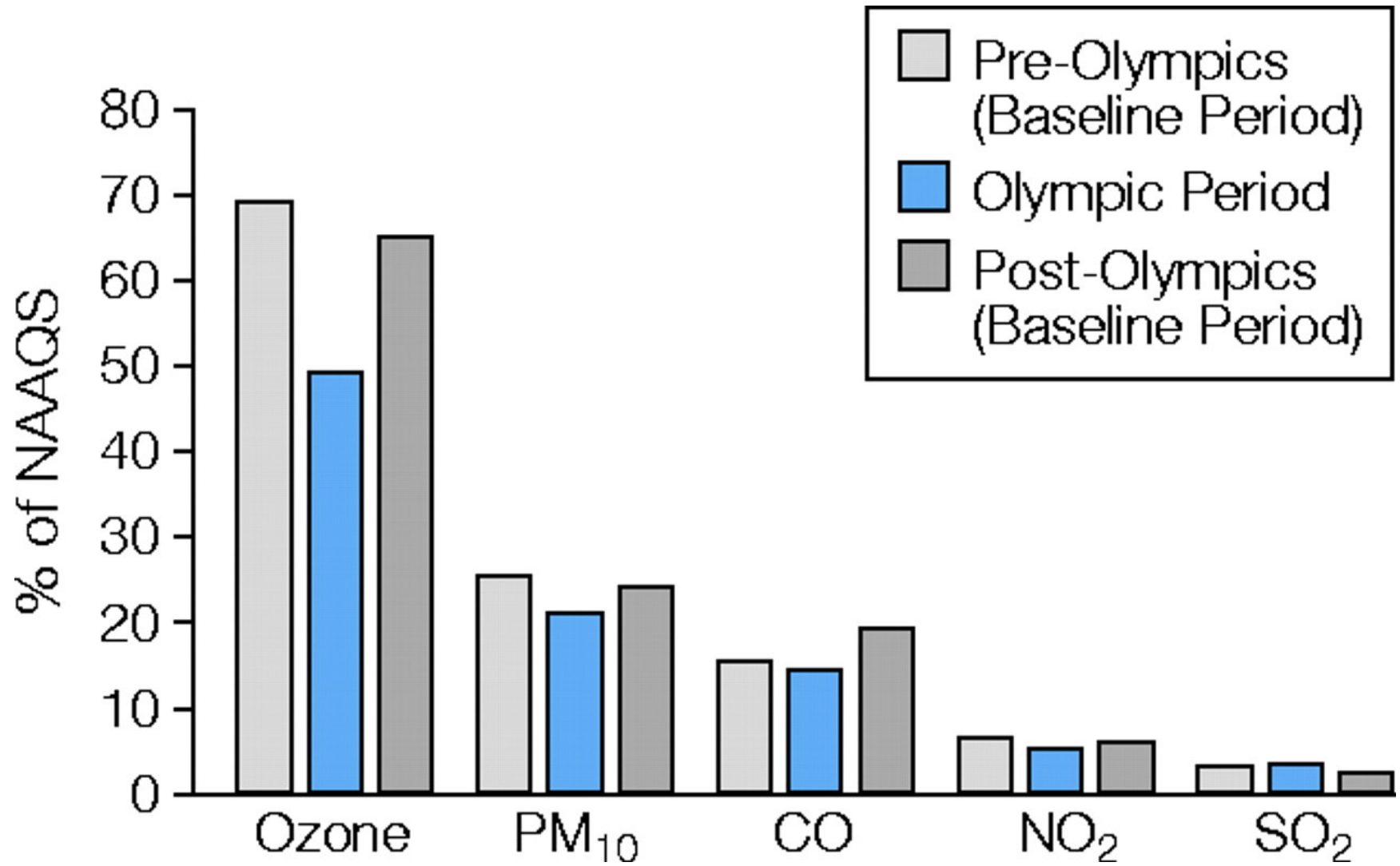
Friedman, M. S. et al. *JAMA* 2001;285:897-905.

Reducing Traffic Reduces Asthma 1996 Atlanta Olympics

- The Result:
 - Weekday morning traffic counts dropped 22.5%
 - Peak daily ozone concentrations decreased 27.9%

Friedman, M. S. et al. JAMA 2001;285:897-905.

Mean Levels of Major Pollutants Before, During, and After the 1996 Summer Olympic Games as a Percentage of the National Ambient Air Quality Standard (NAAQS)



Friedman, M. S. et al. JAMA 2001;285:897-905.

Acute Asthma Events During 1996 Olympics - Atlanta

Type of claim	% change in mean # of Asthma claims per day	% change in mean # of Non-Asthma claims per day
Medicaid Hosp and ED Visits	- 41.6%	- 3.1%
HMO ED, Urgent Visit, Hosp	- 44.1%	+ 1.3%

Friedman, M. S. et al. JAMA 2001;285:897-905.

Southern California Children's Health Study

Traffic-related air pollution and childhood asthma

- Cohort study (n=2,497) examined the effects of traffic-related pollutants near children's schools and homes
 - Asthma and wheeze were strongly associated with residential proximity to a major road¹
 - Greatest risk among children living within 300 m of major roads or freeways and risk increased significantly within 75 m¹
 - Incident asthma was positively associated with traffic pollution among children at school and home, with a hazard ratio of 1.61^{2,3}

¹McConnell R, et al. (2006) Traffic, Susceptibility, and Childhood Asthma. *Environ Health Perspect* 114(5)

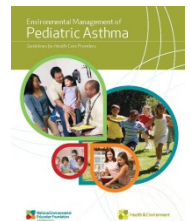
²Jerrett M, et al. (2008) Traffic-Related Air Pollution and Asthma Onset in Children: A Prospective Cohort Study with Individual Exposure Measurement. *Environ Health Perspect* 116(10)

³McConnell R, et al. (2010) Childhood Incident Asthma and Traffic-Related Air Pollution at Home and School. *Environ Health Perspect* 118(7)

Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers

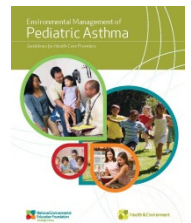
- Founded upon NHLBI Guidelines
- Intended to complement its clinical and pharmacological components
- Developed for primary care providers
 - Pediatricians, family physicians, internists
 - Nurse practitioners, physician assistants
- Authored by expert steering committee and peer reviewed
- Built on scientific literature and best current practices

www.neefusa.org/health/asthma



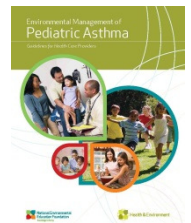
Overview of Asthma Guidelines

- Developed for children 0-18 years, **already diagnosed** with asthma
- Applies to all settings where children spend time
 - Homes, schools, and daycare centers
 - Cars, school buses
 - Camps, relatives'/friends' homes, other recreational or housing settings
 - Occupational environments



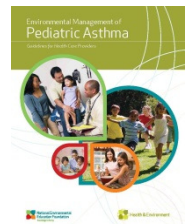
Components of Asthma Guidelines

- Educational competencies
- Environmental history form
- Environmental intervention guidelines
- Sample Patient Flyers and References
- Supplemented by online list of resources with web-links
 - www.neefusa.org/health/asthma/asthma_resources
- Available in English and Spanish online, in hard copy, and on CD-ROM
 - www.neefusa.org/health/asthma/asthmaguidelines



Environmental History Form

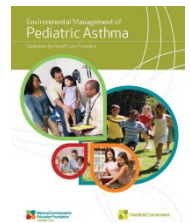
- Quick intake form
- Administered by health care provider
- Available online as PDF and Word document
- Can be pasted or re-copied into electronic medical record template
- Questions are in yes/no format
 - Follow up yes answer with in-depth questions on Intervention Guidelines fact sheets



Environmental History Form

- Parent or child will likely answer questions about exposure with own home in mind
 - Remember to consider other places the child spends time: school, daycare, car, work
- Designed to capture major trigger areas
 - Once identified as a problem, (i.e. dust mites) the intervention sheet provides additional questions

www.neefusa.org/health/asthma/astmahistoryform



Environmental History Form for Pediatric Asthma Patient

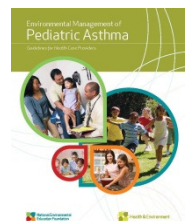
Specify that questions related to the child's home also apply to other indoor environments where the child spends time, including school, daycare, car, school bus, work, and recreational facilities.

	Follow up/ Notes
Is your child's asthma worse at night?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Is your child's asthma worse at specific locations? If so, where? _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Is your child's asthma worse during a particular season? If so, which one? _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Is your child's asthma worse with a particular change in climate? If so, which? _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Can you identify any specific trigger(s) that makes your child's asthma worse? If so, what? _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Have you noticed whether dust exposure makes your child's asthma worse?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does your child sleep with stuffed animals?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Is there wall-to-wall carpet in your child's bedroom?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Have you used any means for dust mite control? If so, which ones? _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you have any furry pets?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you see evidence of rats or mice in your home weekly?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you see cockroaches in your home daily?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do any family members, caregivers or friends smoke?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does this person(s) have an interest or desire to quit?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does your child/teenager smoke?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you see or smell mold/mildew in your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Is there evidence of water damage in your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you use a humidifier or swamp cooler?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Have you had new carpets, paint, floor refinishing, or other changes at your house in the past year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does your child or another family member have a hobby that uses materials that are toxic or give off fumes?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Has outdoor air pollution ever made your child's asthma worse?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does your child limit outdoor activities during a Code Orange or Code Red air quality alert for ozone or particle pollution?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you use a wood burning fireplace or stove?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Do you use unvented appliances such as a gas stove for heating your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure
Does your child have contact with other irritants (e.g., perfumes, cleaning agents, or sprays)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not sure

What other concerns do you have regarding your child's asthma that have not yet been discussed?



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Cuestionario de Historia Ambiental para el Paciente con Asma Pediátrica

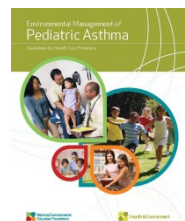
Especifique que preguntas relacionadas al hogar del niño también se aplican a otros ambientes interiores donde el niño pasa el tiempo, incluyendo escuela, guardería, coche, bus escolar, trabajo e instalaciones recreativas.

	Seguimiento/Notas
¿Empeora el asma de su hijo(a) en la noche?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Empeora el asma de su hijo(a) en un lugar específico? Si es así, ¿dónde? _____	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Empeora el asma de su hijo(a) durante una estación en particular? Si es así, ¿cuál es? _____	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Empeora el asma de su hijo(a) con un cambio particular de clima? Si es así, ¿qué cambio? _____	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Puede identificar algún(os) desencadenante(s) específico(s) de asma en su hijo(a)? Si es así, ¿qué desencadenante(s)? _____	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ha notado si la exposición al polvo empeora el asma de su hijo(a)?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Duerme su hijo(a) con muñecos de peluche?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Tiene el dormitorio de su hijo(a) alfombra de pared a pared?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ha tomado algunas medidas para el control de ácaros de polvo? Si es así, ¿cuáles? _____	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Tiene algunas mascotas peludas?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ha visto huellas de ratones o ratas en su hogar, semanalmente?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ve cucarachas todos los días en su hogar?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Fuma algún miembro de la familia, amigo, o persona que cuida a su hijo(a)?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Está(n) esta(s) persona(s) dispuesta(s) a dejar de fumar?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Fuma su hijo(a)/adolescente?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Hay olor a moho o "mildeu" (hongos) in su casa?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Hay alguna evidencia de daño por agua en su casa?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Utiliza usted un humidificador?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ha colocado alfombras nuevas, pintura, bamiz de pisos, u otro cambio en la casa durante el último año?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Tiene su hijo(a), o algún otro miembro de la familia, un pasatiempo que utiliza materiales que son tóxicos o emiten gases tóxicos?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Ha hecho la contaminación del aire de fuera empeorar el asma de su hijo(a)?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Restringe las actividades de su hijo(a) fuera durante la Alerta Naranja o Alerta Roja de Calidad de Aire, o la alerta cuando hay ozono o partículas contaminantes?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Utiliza usted una estufa o chimenea a leña en su casa?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Utiliza usted aparatos como chimeneas o estufas a gas?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Está su hijo(a) en contacto con irritantes (e.g. perfumes, productos de limpieza o aspersores)?	<input type="checkbox"/> Sí <input type="checkbox"/> No <input type="checkbox"/> No está seguro
¿Qué otras cosas acerca del asma de su hijo(a) le preocupan, que no fueron mencionadas?	

Referencia: Manejo Ambiental del Asma Pediátrica: Guías para el Personal de Salud www.neefusa.org/healthy/asthma/asthmaguidelines



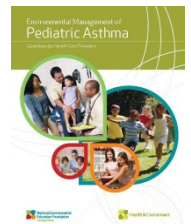
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Intervention Guidelines

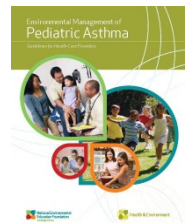
- Two-visit concept
- Short introduction
- Additional in-depth questions
 - Explore exposure sources
 - Parents' current practices
- Intervention recommendations
- Sample patient handouts to download
- Additional resources on initiative's website

www.neefusa.org/health/asthma/intervention_guidelines

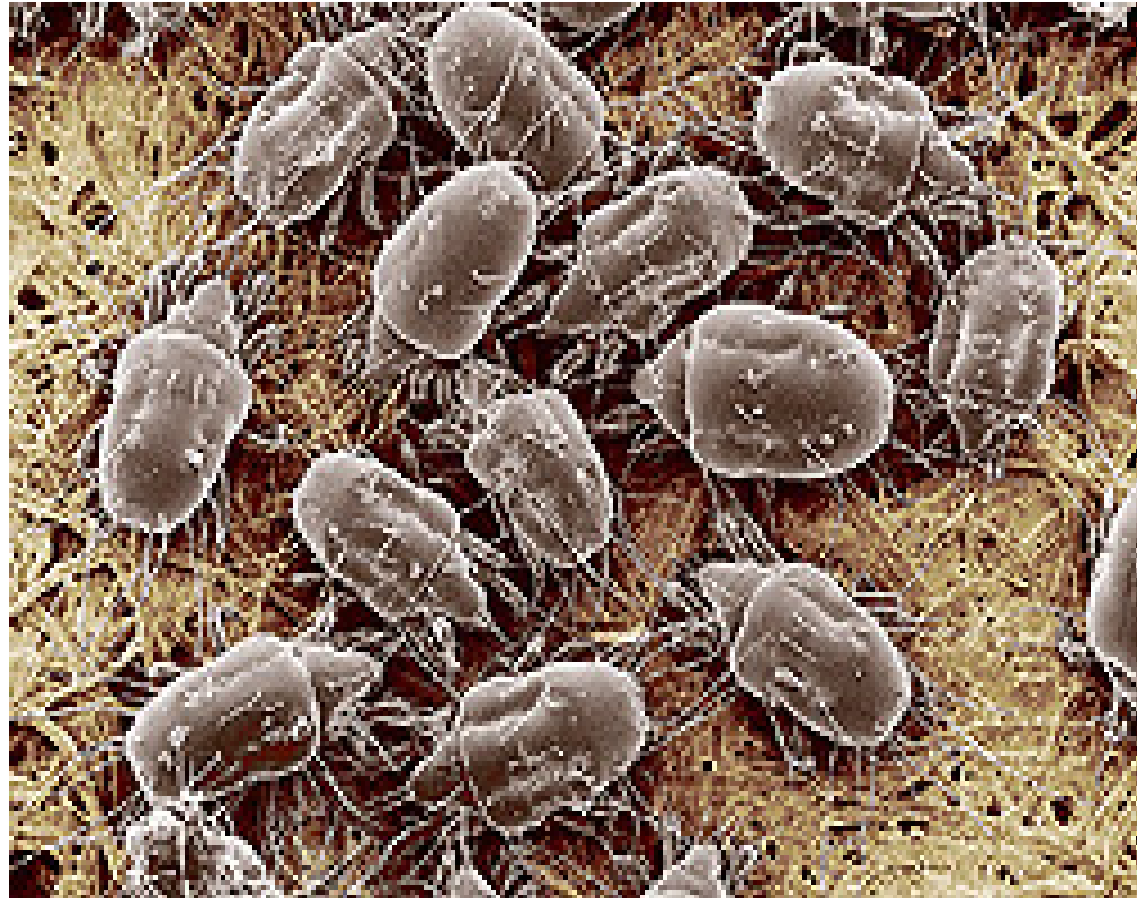


Allergy Referral?

- In vitro testing for allergens can be considered, but false positives occur
 - Should focus on allergens identified in history
 - Should **not** replace timely allergy referral
- Low cost environmental interventions are reasonable, especially where wide spread exposure occurs (i.e. dust mites in SE)
 - Costly interventions should be done after you have referred for skin testing



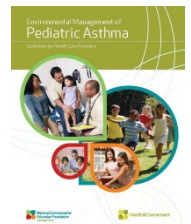
Get Rid of the Dust Mites



Dust Mites

Simple, but Effective Interventions

- Encase all pillows and mattresses of the beds the child sleeps on with allergen impermeable encasings
- Wash bedding weekly to remove allergen
- Wash in HOT water (130°F) to kill mites
- Results generally seen in 1 month
- Avoid ozone generators and some ionic air cleaners that produce ozone



Dust Mites

Other Interventions

- For non-encased bedding (e.g. blankets and quilts) choose items that can withstand frequent hot water washing
- Remove or wash and dry stuffed toys weekly



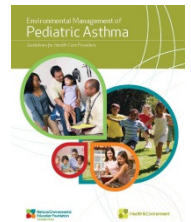
- Vacuum with a HEPA vacuum cleaner
- Avoid humidifiers

Dust Mites

Possible Interventions

- Replace draperies with blinds
- Remove carpet from child's bedroom
- Remove upholstered furniture

- These are higher cost and it is recommended that the child have skin test proven allergy to dust mites prior to implementation



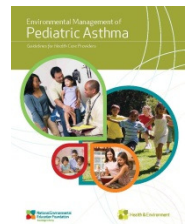
Animal Allergens

Additional Questions

- What type of pet and how many of each?
- Indoor v. Outdoor pet?
- Child sleep with pet?



- Was asthma improved when pet outside?
- Furry pet in child's classroom?



Animal Allergens

Effective Interventions

- Find a new home for indoor pets
- Keep pet outside
- If these aren't possible...
 - Similar interventions as with dust mites
 - Encasings, HEPA air cleaner, HEPA Vacuum,
 - Keep pet out of bedroom
- Takes 24-30 weeks before allergen levels reach those of non-cat households¹



¹Wood RA et al. *J Allergy Clin Immunol* 1989;83:730-4

Animal Allergens

Unlikely Interventions

- Bathing cats MAY be effective at reducing allergen (n = 8 cats)
 - The reduction was not maintained by 1 week¹
 - Therefore it **had** been recommended to bathe the cat twice a week...
- However, a more recent study of 12 cats suggests the decrease in dander after bathing lasts about 1 day²



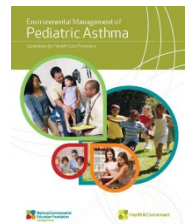
¹Avner DB et al. *J Allergy Clin Immunol* 1997;100:307-12

²Ownby D et al. *J Allergy Clin Immunol* 2006;118:521-2

Cockroach Allergen

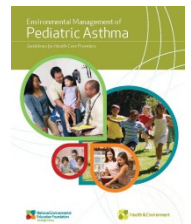
Do's and Don'ts of Roach Control

- Integrated pest management (IPM)
 - Least toxic methods first
- Clean up food/spills
- Food and trash storage in closed containers
- Fix water leaks
- Clean counter tops daily
- Boric acid
- Bait stations/ gels
- **Don't!!**
 - **Spray liquids in house, especially play and sleep space**
 - **Use industrial strength pesticide sprays that require dilution**



Mold and Mildew Interventions

- Ways to control moisture and/or decrease humidity to < 50%
 - Dehumidifier or central air conditioner
 - Do not use a humidifier
 - Vent bathrooms/clothes dryers to outside
 - Use exhaust fan in bathroom/ other damp areas
 - Check faucets and pipes for leaks and repair
- Complete mold abatement may be required using a licensed contractor

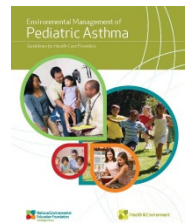


Mold and Mildew

Cleaning up the Mess



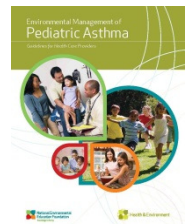
- Discard items too moldy to clean
- Professional cleaning recommended for areas larger than 3 x 3 ft.
- Clean small areas with detergent and water
- Dilute (1:10 with water) chlorine bleach solution provides cosmetic improvement and kills mold but does not remove allergens and the user should be aware of risks
 - Don't mix bleach and ammonia!
 - Be aware of respiratory irritant effect of bleach (asthmatics)
- Identify and stop sources of water intrusion



Environmental Tobacco Smoke

Possible Interventions

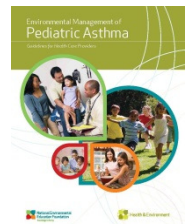
- Keep home and car smoke free
- Encourage support to quit smoking
 - Recommend aids such as nicotine gum/patch
 - Medication from physician to assist in quitting
- Choose smoke free social settings
- At the very least, do not smoke around your child or in the car!
 - (This should not keep us from encouraging parents to quit)



Air Pollution

Possible Indoor Air Interventions

- Eliminate tobacco smoke
- Install exhaust fan close to source of contaminants
- Ventilate room if fuel burning appliance used
- Avoid use of products emitting irritants
- See control of dust mites and animal allergens





Air Pollution

Possible Outdoor Air Interventions

- Monitor air quality index levels
 - Ozone, Particulate Matter, NO_x, SO₂
 - Reduce child's outdoor activities if unhealthy
 - Orange AQI of 101-150 (unhealthy for sensitive groups)
 - Red AQI of 151-199 (unhealthy for all)
- Contact health care provider if more albuterol is needed the day after AQI level is high



Who takes the Advice?

Seen by Allergists v. Pediatricians

- Patients seen by an allergist had greater knowledge of environmental allergens
 - Dust mite knowledge (71% v. 18%)
 - Need for mattress encasements (61% v. 13%)
 - Need for pillow encasements (51% v. 11%)
- Increased knowledge, but not statistically significant
 - More knowledge about carpet removal (23% v. 11%)
 - Stuffed animal removal (10% v. 2%)
- Made some changes in their home
 - Use of mattresses encasements (38% v. 11%)-- 0.001
 - Use of pillow encasements (36% v. 16%)– 0.009
 - Carpet removal (26% v. 36%)-- NS

Callahan KA, et al. *Annals Allergy Asthma Immunol* 2003;90:302-7.

Summary

- Written asthma action plans
- Use inhaled steroids as per NHLBI guidelines for persistent asthma
- Reassess impairment and risk, preferably during periodic asthma check-ups
- Environmental management can and should supplement good medical care
- Ask about environmental exposures and seek ways to intervene
- Low cost interventions are effective in children
- Consider allergy referral to define exposure risk

BURDEN OF ASTHMA

- What are some of the burden of asthma?
- What factors augment the burden of asthma?
- What measures can reduce the burden of asthma?
- What particular harmful air pollutants are commonly found around the U.S. – Mexican border?

Environmental Management of Pediatric Asthma

- Case Discussion

Environmental Management of Pediatric Asthma Guidelines for Health Care Providers

Created by support from the National Environmental Education Foundation through the Pediatric Asthma Initiative

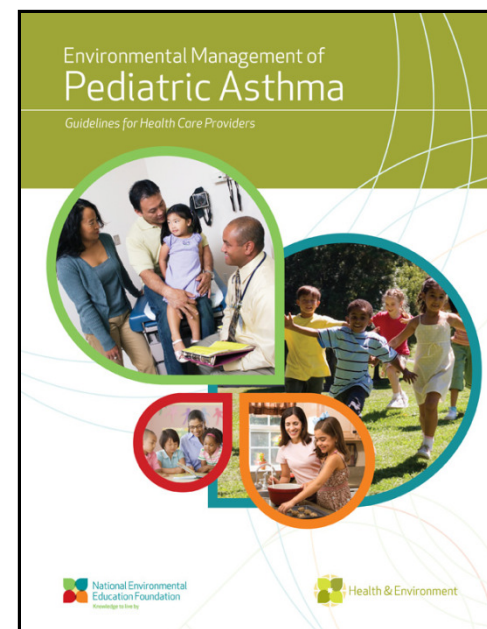
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<http://www.neefusa.org/health.htm>