Environmental Management of Pediatric Asthma:

Guidelines for Health Care Providers

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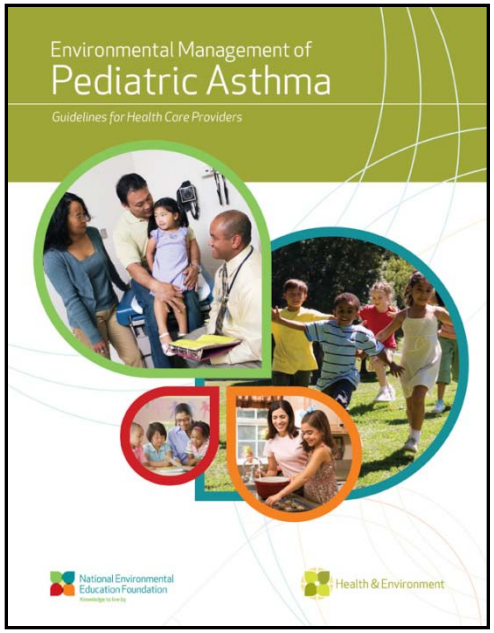


National Environmental Education Foundation
Knowledge to live by

Health & Environment

Pediatric Asthma

- Most prevalent chronic medical condition in childhood
- 7.1 million (9.6%) US children in 2009[1]
  - Low income children more likely to have increased morbidity from asthma[2]
  - Less likely to receive preventive care[2]

[1]Akinbami 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.

[2]Akinbami 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 children[1]
- African-American children as compared to white children[2]
  - >2 times as likely to be hospitalized
  - >3 times as likely to die from asthma

[1]Bloom 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.

[2]Akinbami 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]

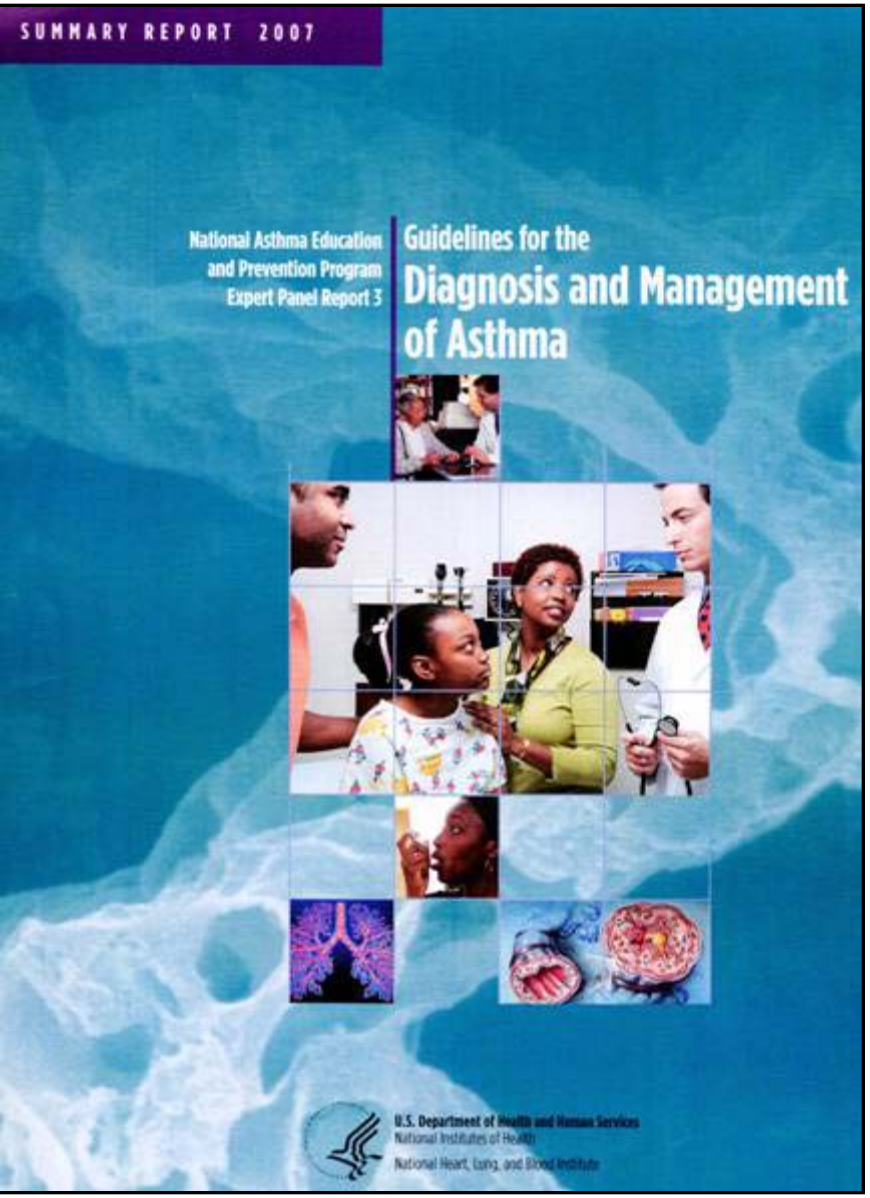
[1]Kim H, et al. Prev Chronic Dis 2009;6(1):A12.
[2]Crocker et a. Chest 2009;136(4):1063-71.

National Survey on Environmental Management of Asthma

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

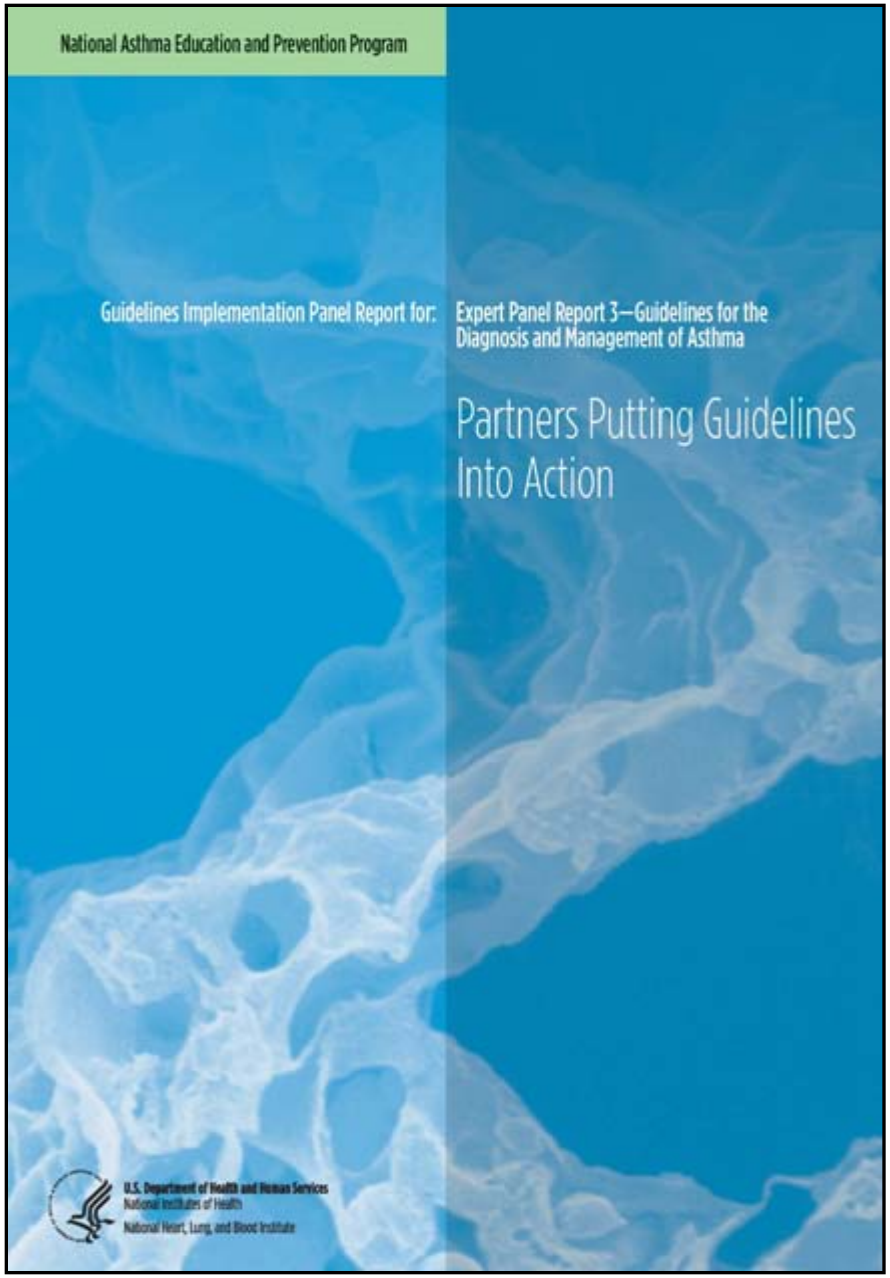
- People from low income, low education households are more likely to have asthma.
- Less than 30% of people with asthma are taking all the essential actions recommended to reduce their exposure to indoor environmental asthma triggers.
- People with written asthma action plans are more likely to take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

US Environmental Protection Agency 2004



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

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

http://www.nhlbi.nih.gov/guidelines/asthma/gip_rpt.pdf

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]

[1]Rachelefsky G. Pediatrics 2009;123:353-66
[2]Castro-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 >
- **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: _____

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

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Before exercise	☐ _____	☐ 2 or ☐ 4 puffs _____ 5 to 60 minutes before exercise

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.

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

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

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.

☐ **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 (ideally between 30–50 percent). Dehumidifiers or central air conditioners 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.

☐ **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.

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, talcum 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**
- Sulfites 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).

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

National Heart Lung and Blood Institute

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

NIH Publication No. 07-5251
April 2007

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

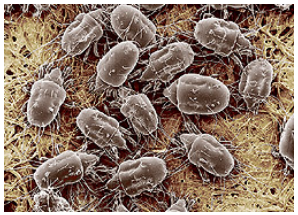
Clearing the Air
Institute of Medicine

–Sufficient evidence of Causal relationship

- –Cats
- –Cockroaches
- –Environmental tobacco smoke in preschool age
- –Household dust mites

–Sufficient evidence of Association

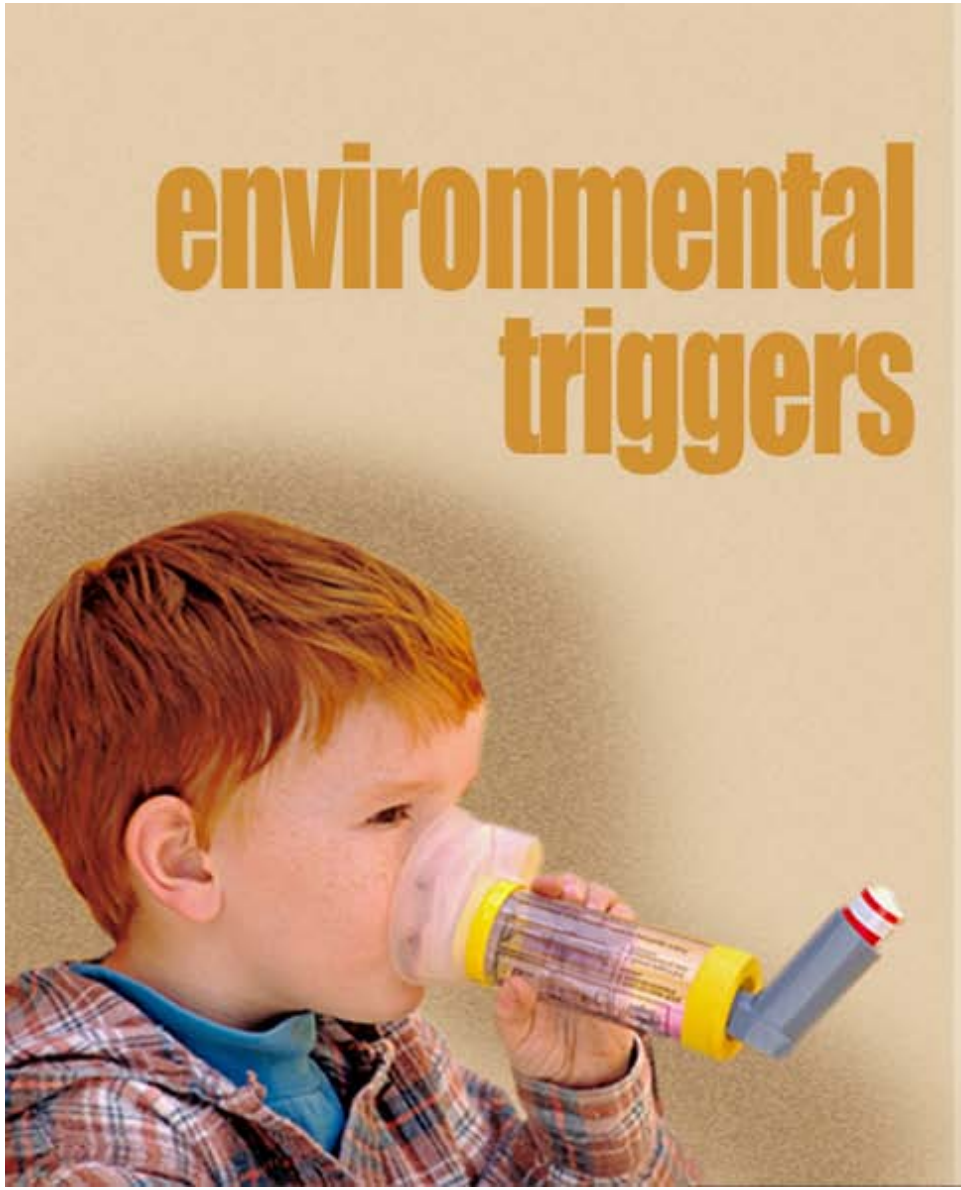
- –Dogs
- –Molds
- –Nitrogen oxides



–Limited evidence of Association

- –Formaldehyde fragrances
- –Environmental tobacco smoke in school age and older children

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



What is the Evidence of Environmental Trigger Control?

Dust Mite Control

- Randomized Controlled Trial
  - 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

Enhert B, et al. *Allergy Clin Immunology* 1992;90:135-8

Dust Mite Control

- Improvements from dust mite encasements[1]
  - Reduced dust mite allergen
  - Improved bronchial hyper-responsiveness
- Improved allergen level, but…
  - No improvement in symptoms, medication needs or bronchial hyper-responsiveness[2]
- Mattress encasement + immunotherapy[3]
  - Encasements alone reduced dust mite concentration
  - Immunotherapy with additional symptomatic improvement

[1]Van der Heide S Allergy 1997:52:9121-7
[2]Frederick JM Eur Respir J 1997;10:361-66.
[3]Paul 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
  - By 12 months half the dose of control group
- No effect on bronchial hyper-responsiveness

Halken S, et al. *J Allergy Clin Immunol* 2003;111:169-176

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 Antigen

- 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 and Dog Antigen

- 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 antigen were filtered in HEPA cleaner than sham filter
  - No change in bulk dust antigen from home samples
- Decrease in nocturnal symptoms
- Trend towards improvement in bronchial hyper-responsiveness, but not significant

Sulser C, et al. *Int Arch Allergy Immunol*. 2009;148:23-30

Mouse Ag

- Inner city population in Boston
  - 42% had mouse allergen in home[1]
  - 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 children[2]
  - 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)

[1]Phipatanakul W, et al. Allergy 2005;60:697-701
[2]Sheehan WJ, et al. Ann Aller 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

Phipatanakul W et al. *Ann Allergy Asthma Immunol* 2004;92:420-5

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

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

Integrated Pest Management
Boston Public Housing

- 39 apartments among 3 public housing buildings
- IPM as described in prior slide as main intervention
- Dust collection sampling for cockroach antigen
  - Bedding (including mattress and pillows)
  - Kitchen cupboards under sink and kitchen floor
- Reduction in cockroach antigens (Bla g 1, Bla g 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

Peters JL, et al. J Asthma 2007;44:455-60

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
  - 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

Kass D, et al. Environ Health Persp 2009;117:1219-25.

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; $p = 0.003$

Kercmar CM, et al. Env Health Persp 2006;114:1574-80

Evidence for Multi-Trigger Control

- CDC performed 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, multi-component 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 http://www.thecommunityguide.org/asthma/rrchildren.html
Last updated: 6/15/2010

Combined Asthma Trigger Management Intervention

- 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 got treatment at end of 12 month period

Eggleston PA, et al. Annal Allergy Asthma Immunol 2005;95:518-24

Combined Asthma Trigger Management Results

- 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 ($p = 0.04$)

Eggleston PA, et al. Annal Allergy Asthma Immunol 2005;95:518-24

Inner City Asthma Study
Intervention

- 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

Szefler SJ et al. *J Allergy Clin Immun 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 symptoms[1]
- Greater decline in level of allergens at home[2]
  - Persisted through 2nd "follow up" year
  - Reduced dust and cockroach antigen correlated with fewer complications of asthma
- Cost Effectiveness analysis[3]
  - 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
[3]Kattan M, et al. *J allergy Clin Immunol* 2005;116:1058-63

Outdoor Air Pollution
Intervention

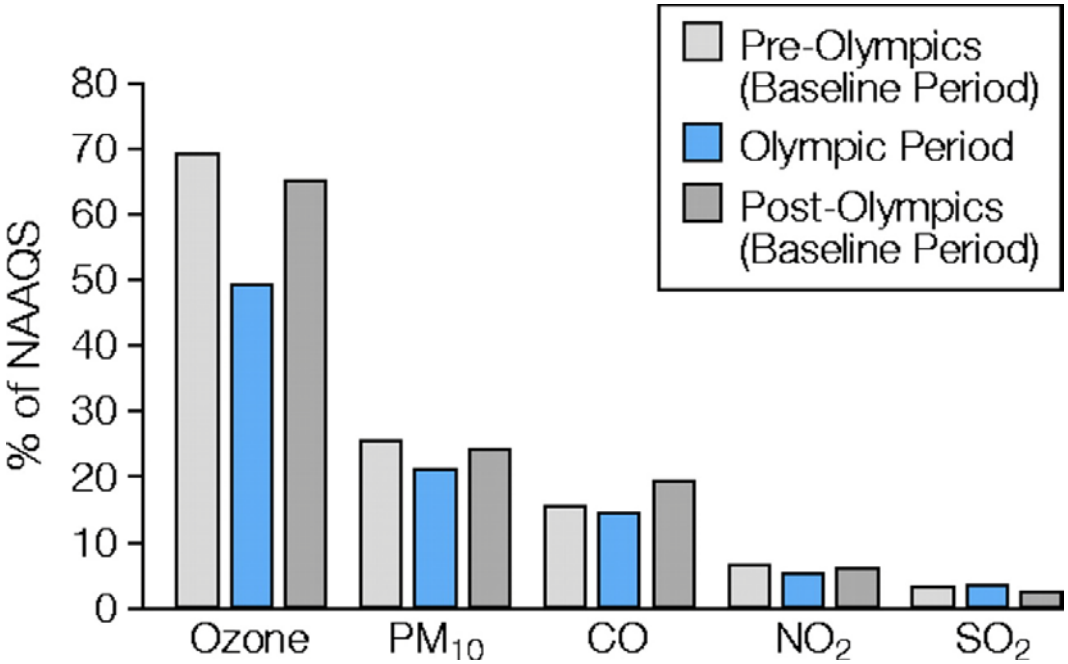
- Reducing Traffic in 1996 Atlanta Olympics
- Around-the-clock public transportation
  - 1,000 buses added
  - Downtown city streets closed to private cars
  - Downtown delivery schedules altered
  - Flexible and telecommuting work schedules encouraged

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

Outdoor Air Pollution Results

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)

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



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

Outdoor Air Pollution Results

Type of claim	% change in mean number of asthma claims/day	% change in mean number of non-asthma claims/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.

2002 Summer Asian Games
Busan, Korea

- Data from Atlanta are reproducible!
- Transportation controls similar to those in Atlanta
  - Reduction in hazardous air pollutant levels of up to 25%
  - Relative risk of asthma hospitalization
    - 27% decrease from baseline during reduced pollution period
    - Did not achieve statistical significance

Lee et al. J Air Waste Manag Assoc. 2007 Aug;57(8):968-73.

Southern California Children's Health Study

Traffic-related air pollution and childhood asthma

- Cohort study (n=2,497) examined effects of traffic-related pollutants near children's schools and homes
  - Asthma and wheeze strongly associated with residential proximity to major road[1]
    - Greatest risk among children living within 300 m of major roads or freeways
    - Risk increased significantly within 75 m[1]
    - Incident asthma positively associated with traffic pollution among children at school and home, with a hazard ratio of 1.61[2,3]

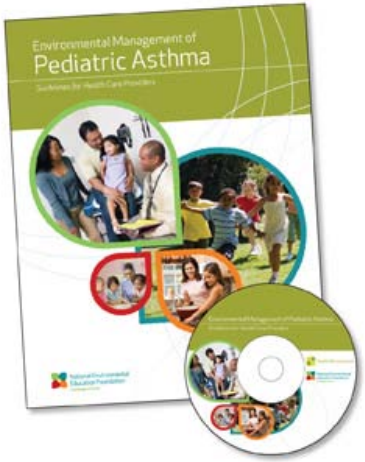
[1]McConnell R, et al. (2006) Traffic, Susceptibility, and Childhood Asthma. *Environ Health Perspect* 114(5)

[2]Jerrett 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)

[3]McConnell 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

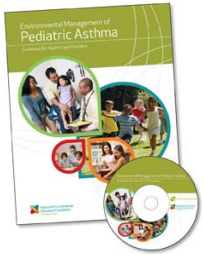
- Founded upon NHLBI Guidelines
  - Intended to complement its clinical and pharmacological components
- Developed for primary care providers
  - Pediatricians, family physicians, internists
  - Nurse practitioners, physician assistants
- Authored by expert steering committee and peer reviewed
- Built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



http://www.neefusa.org/Health/asthma.htm

Overview of Guidelines

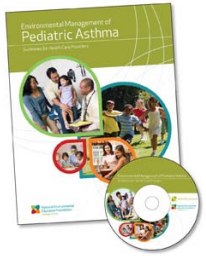
- Developed for children 0-18 years already diagnosed with asthma
- Applies to all settings where children spend time
  - Homes, schools, and daycare centers
  - Cars, school buses
  - Camps, other recreational/housing settings
  - Occupational environments
- Endorsed by:
  - Academic Pediatric Association
  - American Association of Colleges of Nursing
  - Association of Faculties of Pediatric Nurse Practitioners
- Supported by:
  - American Academy of Pediatrics
  - National Association of Pediatric Nurse Practitioners



Components of Guidelines

- Educational competencies
- Environmental history form
- Environmental intervention guidelines
- Sample patient flyers and references
- Supplemented by online list of resources with links
  - http://www.neefusa.org/health/asthma/asthma_resources.htm

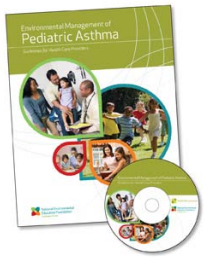
- Available in English and Spanish online, in hard copy, and on CD-ROM
  - http://www.neefusa.org/health/asthma/asthmaguidelines.htm



Intervention Guidelines

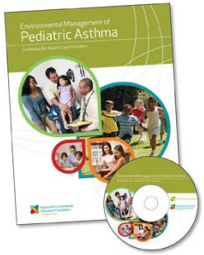
- Two-visit concept
- Short introduction
- Additional in-depth questions
  - Explore exposure sources
  - Parents' current practices
- Intervention recommendations
- Sample patient handouts to download
- Additional resources on initiative's website

http://www.neefusa.org/Health/asthma.htm



Environmental History Form

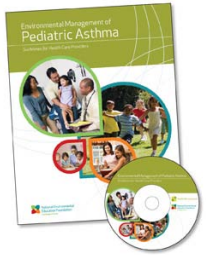
- Quick intake form
- Administered by health care provider
- Available online as PDF and Word document
- Can be pasted or re-copied into electronic medical record template
- Questions are in yes/no format
  - Yes answers can be followed up with more in-depth questions from the Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers manual



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

http://www.neefusa.org/Health/asthmahistoryform.htm



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

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

_____

_____

National Environmental Education Foundation
Knowledge to Live by

Health & Environment

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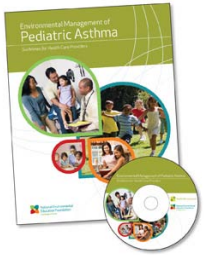
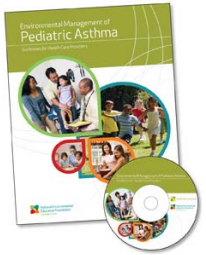


Dust Mites
Interventions

- Encase all pillows and mattresses
- Wash bedding and stuffed toys weekly in hot water (130° F) to remove allergens and kill mites
- Avoid use of ozone generators and certain ionic air cleaners that can generate harmful ozone
- Vacuum with a HEPA vacuum cleaner
- Avoid humidifiers
- High cost interventions where skin test proven allergy recommended prior to implementation
  - Replace draperies with blinds
  - Remove carpet from child's bedroom
  - Remove upholstered furniture



Animal Allergens

Animal allergies are not caused by fur. Proteins secreted in the animal's saliva or by oil glands that are shed as dander cause animal allergies. These allergens are carried on very small particles that can persist for weeks or months even after a pet is gone.

Do you have any furry pets?

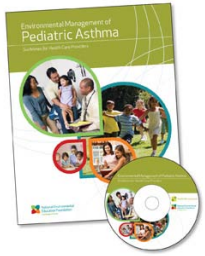
Do your child sleep with the pet?

Has your child's asthma become worse since having the pet?

Do you see evidence or rats or mice in your home weekly?

Animal Allergens
Interventions

- Find a new home for indoor pets
- At a minimum, keep pets outside
- If these aren't possible…
  - Keep pets out of the bedroom
  - Follow similar interventions as with dust mites
- Bathing cats and dogs has been shown to decrease these allergens but…
  - It must be done at least twice a week to be effective
- To exterminate rats or mice, use the least toxic method, such as baits and traps



Cockroach Allergen

Droppings, body parts, and the saliva of cockroaches and other pests contain protein allergens that can cause allergic reactions or trigger asthma symptoms. Cockroaches follow food and water sources in your house and eradication can be very difficult.

Do you see cockroaches in your home daily?

Do you see evidence of cockroach droppings?

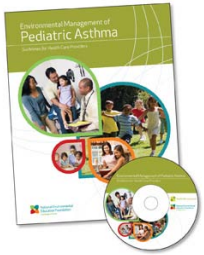
How do you get rid of cockroaches in your home?

Does your child's school or other places he/she spends time have cockroaches?

Cockroach Allergens
Interventions

- Clean up all food items, crumbs, and spills ASAP
- Store food and trash in closed containers
- Limit spread of food around house, especially bedrooms
- Fix water leaks under sinks
- Mop kitchen floor at least once a week
- Clean counter tops daily
- Use least toxic extermination method, such as bait stations and gels

★Never use industrial strength pesticide sprays without consulting a professional



Molds and Mildew

Mold spores are allergens that can be found both indoors and outdoors. Indoors they are found in dark, warm, humid environments like bathrooms, attics, basements, and laundry rooms. Outdoors they grow in moist, shady areas and are common in soil, decaying vegetation, compost piles, rotting wood, and fallen leaves.

Do you see or smell mold/mildew in your home?

Is there evidence of water damage in your home?

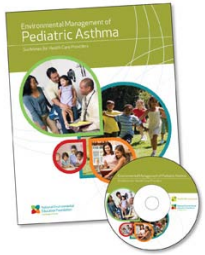
Do you use a humidifier or swamp cooler?

Do you frequently have condensation on your windows?

Mold and Mildew
Interventions

- Control all sources of moisture in house
  - Repair leaky faucets, pipes, and ductwork
  - Use dehumidifer or air conditioner
  - Vent bathrooms and dryers to outside
  - Use exhaust fans in kitchen, bathroom, and other damp areas
- Items too moldy to clean should be discarded
- Clean small areas with:
  - Chlorine bleach mixed 1:10 with water
  - Quaternary ammonia cleaners if bleach can't be used

    ★Don't mix bleach and ammonia cleaners due to toxic fumes!
- Areas larger than 9 square feet should be professionally cleaned



Environmental Tobacco Smoke

Children exposed to tobacco have more asthma attacks, lower respiratory infections, middle ear infections and an increased risk of sudden infant death syndrome. Smoking outside is not enough to limit harm to children. Smoke settles in clothes, hair, car upholstery, and furniture.

Do any family members, caregivers or friends smoke?

Does this person have an interest or desire to quit?

Does your child or teenager smoke?

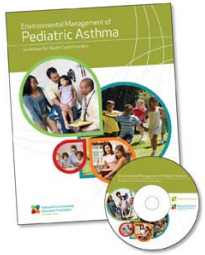
Have you established a no smoking policy in the household?

Does anyone smoke in childcare settings where the child stays?

Environmental Tobacco Smoke Interventions

- Keep home and car smoke free
- Seek support to quit smoking
  - Consider aids such as nicotine gum, patch, and medication from physician to help in quitting
- Choose smoke free childcare and social settings
- If you choose to smoke, do not smoke near your child

- If you are a provider and a parent or caregiver acknowledges he/she smokes, write a referral for a smoking cessation or community support program



Indoor Air Pollution

Americans spend up to 90% of their time indoors. Fumes from wide range of common household products can irritate the airway. Solvents and other chemicals can be found in building materials and can volatize for up to 2 years after construction. Nitrogen dioxide is an irritating gas that is a by-product of indoor fuel-burning appliances.

Have you had new carpets, paint, floor refinishing or other changes at your house in the past year?

Does your child or another family member have a hobby that uses materials that are toxic or give off fumes?

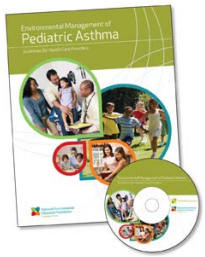
Does your child have contact with other irritants (e.g., perfumes, cleaning agents, sprays)?

Do you use a wood burning fireplace or stove?

Do you use unvented appliances such as a gas stove for heating your home?

Indoor Air Pollution Interventions

- Eliminate tobacco smoke
- Install exhaust fans close to the source of contaminants and vent to outside
- Properly ventilate room where fuel burning appliance is being used
- Avoid strong odors and minimize use of products emitting irritants
  - Strong perfumes, talcum powder, hair sprays, cleaning products, paint fumes, air freshener sprays
- Use good housekeeping to control particles
  - Same control practices as with dust mites and animal allergens



Outdoor Air Pollution

Fine particles and ozone are the most significant outdoor air pollutants. Sources include industrial and vehicular pollution, diesel exhaust from highway traffic and school buses, pollens, and other aeroallergens. These pollutants can worsen asthma and risk is increased with outdoor exertion during poor air quality conditions.

Has outdoor air pollution ever made your child's asthma worse?

How do you hear about air quality alerts?

Does your child limit outdoor activity during air quality alerts for ozone and particulate matter?

Do you live within 300 yards of a major roadway or highway?

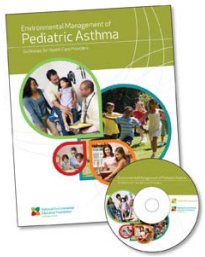
Is your child's asthma worse with a particular change in climate?

Outdoor Air Pollution Interventions

- Monitor air quality index levels http://airnow.gov/
  - Choose indoor physical activities if unhealthy outdoor air

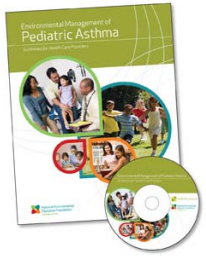
- Contact health care provider if more albuterol is needed the day after AQI level is high
- Advise your child to avoid being near the exhaust pipes of idling buses and truck
  - Turn your key…be idle free

- Use HEPA filters in household vents
- Use central air conditioning
  - Avoid use of swamp coolers during high ozone and pollen conditions



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
  - Costly interventions should be reserved for after allergy referral for skin testing



Allergists versus Pediatricians
Whose Advice is Being Used?

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

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

Summary

- Environmental management can and should supplement good medical care
  - Written asthma action plans
  - Use inhaled steroids as per NHLBI guidelines
  - Reassess impairment and risk with periodic asthma check-ups
- Ask about environmental exposures and seek ways to intervene
- Low cost interventions are effective in children
- Consider allergy referral to define exposure risk when:
  - Poorly controlled asthma
  - Costly interventions are being entertained

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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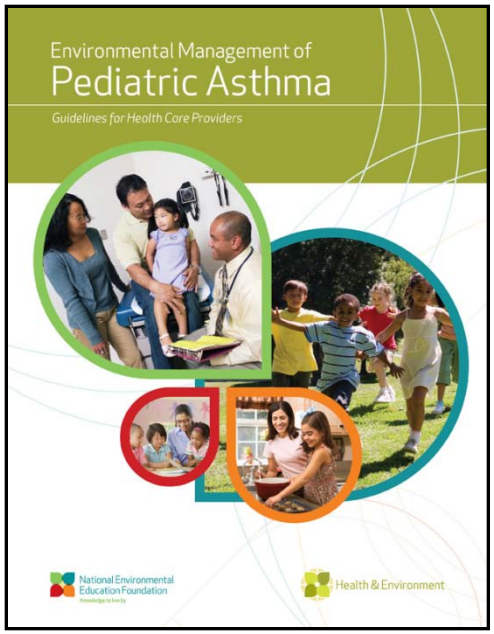

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