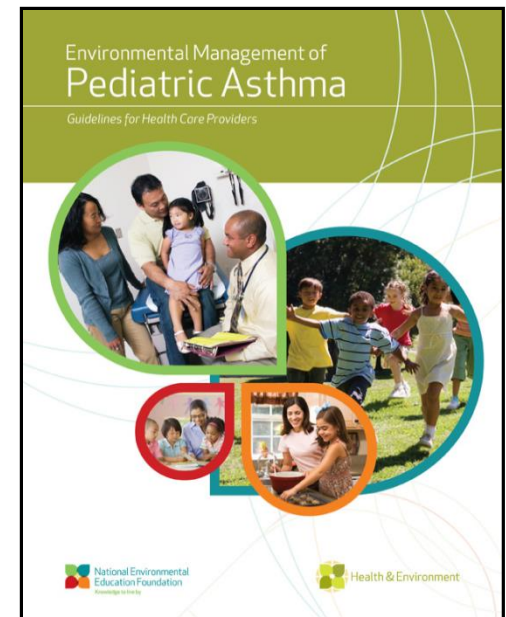


# Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers

Lisa de Ybarrondo, MD  
Associate Professor, Pediatrics  
University of Texas Medical School at Houston  
[Lisa.DeYbarrondo@uth.tmc.edu](mailto:Lisa.DeYbarrondo@uth.tmc.edu)



# PEDIATRIC ASTHMA TEXAS

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- The burden of asthma falls disproportionately on children < 10 years
- Children under 5 years, most frequently hospitalized
- Among Texas Medicaid recipients: children <15 years, male, and African American- highest rates of asthma, ED visits and hospitalizations
- ED visits and hospitalizations for children- more than twice the rate among adults
- Medicaid recipients used short acting beta-agonists more frequently than inhaled corticosteroids

<sup>1</sup>MJ Smith, et al. J Asthma 2005; 42(6): 447-53

# National Survey on Environmental Management of Asthma

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

- People from low income, low education households- more likely to have asthma.
- < 30% with asthma are taking essential actions to reduce exposure to indoor environmental asthma triggers.
- People with written asthma action plans- more likely to take actions to reduce exposure. Only 30% 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.

## NAEPP Guidelines Implementation Panel Message #6: Control Environmental Exposures

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- Review the environmental history of exposures
- Develop a multi-pronged strategy to reduce exposure to those triggers to which a patient is sensitive

# Clearing the Air

## Institute of Medicine

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–Sufficient evidence of a Causal relationship for the development of asthma and increased asthma severity

–**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**



# What is the Evidence of Environmental Trigger Control?



# Inner City Asthma Study

## Combined Asthma Trigger Management

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- RCT in 7 U.S. cities evaluating multi-trigger management
- 937 urban children with asthma age 5 to 11
  - 40% Hispanic, 37% African Americans, low SES, moderate to severe asthma
- 1 year of intervention, 1 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

Szeffler 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

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- Fewer days with symptoms missed school days, and acute care visits/year <sup>1</sup>
- Greater decline in level of allergens at home<sup>2</sup>
  - Persisted through 2<sup>nd</sup> “follow up” year
  - Dust and cockroach Ag correlated with fewer complications of asthma
- Cost Effectiveness analysis<sup>3</sup>
  - 38 more symptom free days
  - \$27 per symptom free day

<sup>1,2</sup>Morgan WJ, et al. *New Engl J Med* 2004;351:1068-80

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



# CDC Community Guide

## Systematic Review

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- Systematic review of 20 studies targeting children
- Evaluated evidence on effectiveness of home-based, multi-trigger, multicomponent environmentally-focused interventions.
- **FINDINGS:**
  - Reduced asthma symptom days by **21 days/year**
    - Range: 16-60 days/year
  - Reduced school days missed by **12.3 days/year**
    - Range 3.4-31.2 days/year
  - Reduced number of asthma acute care visits by **0.57/year**
    - Range 0.33-1.71 visits/year
- **CONCLUSIONS: Interventions with an environmental focus are effective in improving overall quality of life and productivity in children and adolescents with asthma**

Crocker DD, et al. Effectiveness of Home-Based, Multi-Trigger Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity. Am J Prev Med 2011;41(2S1):S5-S32.

# Southern California Children's Health Study

## Traffic-related air pollution and childhood asthma

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- 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 road<sup>1</sup>
    - Greatest risk among children living within 300 m of major roads or freeways and risk increased significantly within 75 m<sup>1</sup>
    - Incident asthma was positively associated with traffic pollution among children at school and home.<sup>2,3</sup>

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

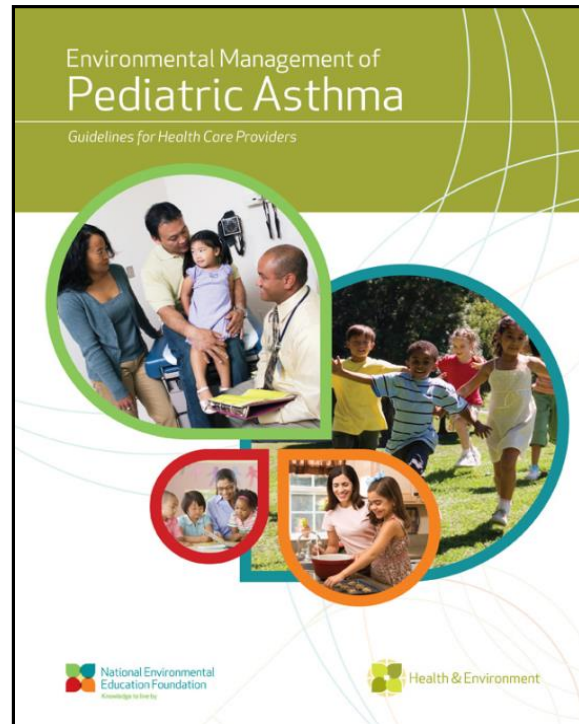
<sup>2</sup>Jerrett M, et al. (2008) Traffic-Related Air Pollution and Asthma Onset in Children: A Prospective Cohort Study with Individual Exposure Measurement. *Environ Health Perspect* 116(10)

<sup>3</sup>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

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



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

# Environmental Management of Pediatric Asthma: Guidelines for Health Care Providers

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- Founded upon NHLBI Guidelines
- Developed for primary care providers
- Authored by expert steering committee and peer reviewed
- Built on scientific literature and best current practices
- Environmental history form
- Environmental intervention guidelines
- Sample Patient Flyers and References
- Supplemented by online list of resources with web-links
  - [http://www.neefusa.org/health/asthma/asthma\\_resources.htm](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/astmaguidelines.htm>



# Overview of Guidelines

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- Developed for children 0-18 years already diagnosed with asthma
- Applies to all settings where children spend time
  - Homes, schools, and daycare centers
- Endorsed by and Supported by:
  - Academic Pediatric Association
  - American Academy of Pediatrics
  - National Association of Pediatric Nurse Practitioners

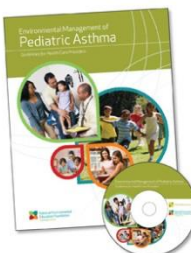


# Environmental History Form

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- 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/astmahistoryform.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?	<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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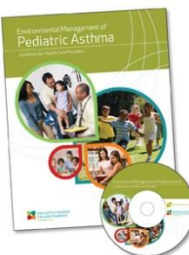


# Allergy Referral?

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- NAEPP: patients with persistent asthma should have an allergy assessment through skin or in vitro testing
  - serum-specific IgE should be complementary to ST due to variability of performance<sup>1</sup>
  - should focus on allergens identified in history
  - should **not** replace timely allergy referral
- Low cost environment 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

<sup>1</sup>CALABRIA CW, *Allergy Asthma Proceedings*, 2009; 30 (4): 386-96





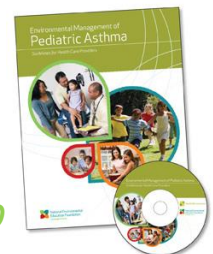
# Dust Mites

## Interventions

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- Encase all pillows and mattresses
- Wash bedding and stuffed toys weekly in hot water (120° F is sufficient) to remove allergens and kill mites
- Choose blankets and quilts that can withstand frequent hot water washing
- Vacuum with a HEPA vacuum cleaner
- Avoid humidifiers
- High cost interventions- recommend skin test proven allergy prior to implementation
  - Replace draperies with blinds
  - Remove carpet from child's bedroom
  - Remove upholstered furniture



# Animal Allergens

## Effective Interventions

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- 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 up to 6 months before allergen levels reach those of non-cat households<sup>1</sup>



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



# Animal Allergens

## Unlikely Interventions

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- Bathing cats MAY be effective at reducing allergen (n = 8 cats)
  - The reduction was not maintained by 1 week<sup>1</sup>
  - 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 day<sup>2</sup>



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

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

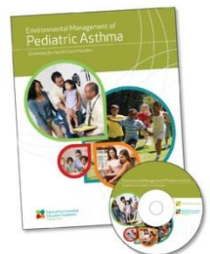


# Cockroach Allergens

## Interventions

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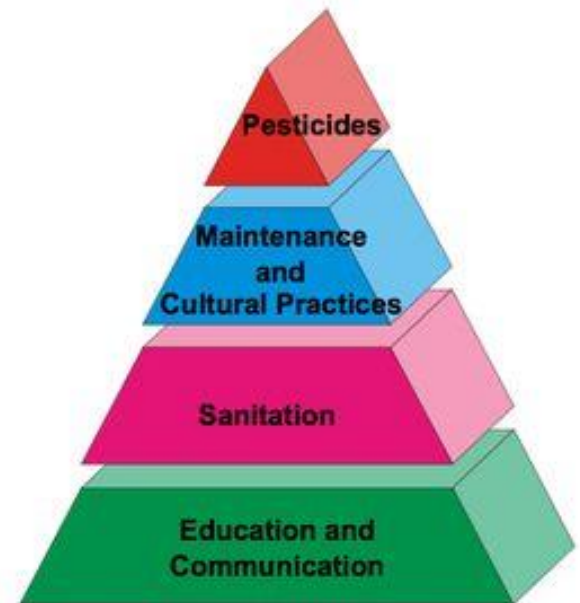
- Clean up all food items, crumbs, and spills ASAP
- Store food and trash in closed containers
- Limit spread of food around house, especially bedrooms
- Fix water leaks under sinks
- Mop kitchen floor at least once a week
- Clean counter tops daily
- Use least toxic extermination method, such as bait stations and gels
- ★ Never use industrial strength pesticide sprays without consulting a professional



# Integrated Pest Management

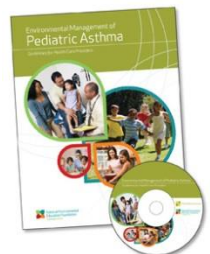
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- Pest control strategy that involves “least toxic methods first”
- Strategies vary, but often may include:
  - Mousetraps
  - Sealing cracks/ small holes
  - Resident education
  - Plastic food storage containers
  - Generalized cleaning
- Strategic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



# Mold and Mildew Interventions

- Control all sources of moisture in house
  - Repair leaky faucets, pipes, and ductwork
  - Use dehumidifier or air conditioner
  - Vent bathrooms and dryers to outside
  - Exhaust fans in kitchen, bathroom, damp areas
- Clean small areas w/ ammonia-based detergents/H<sub>2</sub>O
- Diluted chlorine bleach (1:10 w/ H<sub>2</sub>O) provides cosmetic improvement, kills mold, but does not remove allergens
  - Don't mix bleach and ammonia due to toxic fumes!
  - Be aware of respiratory irritant effect of bleach (asthmatics)
- Areas larger than 9 square feet should be professionally cleaned



# Environmental Tobacco Smoke

## Possible Interventions

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- 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)



# Indoor Air Pollution

## Possible Interventions

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- 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





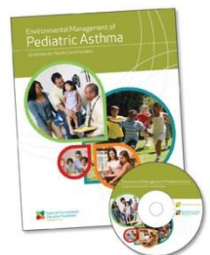


# Outdoor Air Pollution Interventions

- 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



# Summary

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- 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