The Science and Value Behind Targeted Home Environmental Interventions Webinar

October 22, 2009
1 – 2:30 pm
“The Science and Value Behind Targeted Home Environmental Interventions”

The Community Guide Asthma Review

Special Topics in Program Evaluation Webinar

October 22, 2009

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Colin Ligon| Briana Lawrence| Theresa Sipe
Disclaimer

The findings and conclusions in this presentation should not be construed to represent any Task Force on Community Preventive Services or CDC determination or policy.
Objectives

- To link the evaluation of the systematic review of home-based interventions to the CDC Framework for Program Evaluation
- To provide a useful tool for partners in asthma control
- To help the participants become familiar with the analytic framework of the systematic review of home-based environmental interventions
- To describe the impact of these interventions on quality of life, health care utilization and productivity for people with asthma
- To identify the applicability, barriers to implementation, and additional benefits of these interventions
Some Terminology

Individual Studies → Narrative Reviews → Systematic Reviews → Metanalysis → Practice Guidelines
The Community Guide

- Resource for public health

- Directed by the Task Force on Community Preventive Services

- Established in 1996; at CDC

- Conducts rigorous systematic reviews of evidence for community interventions

- Makes recommendations for use of public health interventions

- http://www.thecommunityguide.org
Steps in a Community Guide Review

1. Convene systematic review team
2. Conceptualize topic (logic model)
3. Define the intervention and the goal for the review
4. Search for evidence
5. Conceptualize intervention review (analytic framework)
6. Data abstraction and critical evaluation
7. Summarize evaluation results
8. Task Force Deliberation
9. Disseminate to stakeholders and/or decision makers
Why Asthma?

>20 million Americans
4.7 million office visits
1.8 million ED visits

~500,000 Hospitalizations
$37.2 billion/yr
12.8 million missed school days

CDC
Coordination and Consulting Team

Task Force Member
Ned Calonge…CO Dept of PH

External Partners
Denise Dougherty, PhD…………… AHRQ
Katherine Pruitt, PhD……………… ALA
Alisa Smith, PhD…………………… US EPA
Kurt Elward, MD…………………… AAFP

CDC
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Gema Dumitru, MD………………… APRHB
Colin Ligon, fellow………………… APRHB
Elizabeth Herman, MD…………… APRHB
Tursynbek Nurmagambetov, PhD… APRHB
David Hopkins, MD………………… Community Guide
Briana Lawrence, fellow…..Community Guide
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National Center for Healthy Housing

Darryl C. Zeldin, M.D.
Environmental Diseases & Medicine Program
Division of Intramural Research
National Institute on Environmental Health Sciences (NIEHS)
The Air Pollution & Respiratory Health Branch, CDC

- A branch within the National Center for Environmental Health (NCEH)

- National Asthma Control Program

- Aims to identify effective interventions
  - To guide our funded programs and others in appropriately allocating their resources
  - To direct our research and evaluation activities
CDC Evaluation Framework

Steps

Engage stakeholders

Ensure use and share lessons learned

Describe the program

Justify conclusions

Focus the Evaluation design

Gather credible evidence

Standards

Utility
Feasibility
Propriety
Accuracy

Engage stakeholders

Steps
Engage Stakeholders

- State Health Departments
- Academics
- NGO’s/Advocacy groups
- CDC and Federal agencies
- Field staff
- Asthma patients and families
- Community members
- Health care providers
CDC Evaluation Framework

Steps
- Engage stakeholders
- Describe the program
- Focus the Evaluation design
- Gather credible evidence
- Justify conclusions
- Ensure use and share lessons learned

Standards
- Utility
- Feasibility
- Propriety
- Accuracy
Describe the Program

- Describe what the program does
- Program activities
- Outcomes
- Logic model
Describe the Program

To systematically review the effectiveness of multicomponent, multi-trigger home-based environmental interventions in improving asthma morbidity
Why Home-Based Asthma Interventions?

- Dust Mites
- Cockroach Allergens
- Rodents
- Pet Dander
- Mold
- Cigarette Smoke
Analytic Framework
Home-Based Environmental Interventions

"Home Visits" → Change in asthma morbidity
Two Major Pathways: Environmental and Behavioral Change

- Physical Environment (Home)
  - Living spaces
  - Structural gaps
  - Moisture
  - Overcrowding

- Environmental Assessment

- "Home Visits"

- Education (ranging from allergen avoidance measures to self-management)

- Persons (households) with Asthma

- Environmental Remediation

- Change in asthma morbidity
Environmental Change

**Physical Environment (Home)**
- Living spaces
- Structural gaps
- Moisture
- Overcrowding

**Environmental Assessment**

**“Home Visits”**

**Change in levels of asthma triggers**
- Allergens (i.e. dust mites, cockroach, mold)
- Particulates
- Tobacco Smoke
- Viruses

**Environmental Remediation**

**Persons (households) with Asthma**

**Change In Asthma Control**

**Education**
- (ranging from allergen avoidance measures to self-management)

**Change in asthma morbidity**

*With additional definitions and criteria*
Behavior Change

Physical Environment (Home)
- Living spaces
- Structural gaps
- Moisture
- Overcrowding

Environmental Assessment

“Home Visits”

Environmental Remediation

Change in levels Of asthma triggers
Allergens (i.e. dust mites, cockroach, mold)
Particulates
Tobacco Smoke
Viruses

Change in Asthma Control *

Change in Asthma Maintenance
(i.e., controller medications, asthma action plans)

Change in Clinical Interactions/Management*

Change in levels Of asthma triggers
Allergens (i.e. dust mites, cockroach, mold)
Particulates
Tobacco Smoke
Viruses

Education (ranging from allergen avoidance measures to self-management)

Persons (households) with Asthma

Change in Asthma Knowledge, Attitudes, Skills

Change in Asthma Management Behaviors *

Change in Asthma Behavior Reduction Behaviors *

With additional definitions and criteria
Environmental and Behavioral Change Should Impact “Control”

Environmental Assessment
- Physical Environment (Home)
  - Living spaces
  - Structural gaps
  - Moisture
  - Overcrowding
- “Home Visits”
- Education (ranging from allergen avoidance measures to self-management)

Persons (households) with Asthma
- Change in Asthma Knowledge, Attitudes, Skills
- Change in Asthma Management Behaviors *
- Change in levels Of asthma triggers
  - Allergens (i.e. dust mites, cockroach, mold)
  - Particulates
  - Tobacco Smoke
  - Viruses

Environmental Remediation

Change In Asthma Control *
- Change in Use of Rescue Medications
- Change in Asthma Exacerbations *

Change in Clinical Interactions/Management*

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Use of Rescue Medications

With additional definitions and criteria
...and May Improve Physiologic Measures of Asthma

- Physical Environment (Home)
  - Living spaces
  - Structural gaps
  - Moisture
  - Overcrowding

- Environmental Assessment
  - “Home Visits”

- Environmental Remediation

- Education (ranging from allergen avoidance measures to self-management)

- Persons (households) with Asthma

- Change in Asthma Knowledge, Attitudes, Skills

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  - Change in Use of Rescue Medications
  - Change in Asthma Exacerbations *

- Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

- Change in Clinical Interactions/Management*

- Change in Asthma Exacerbations *

- Change in Physiologic Measures
  - Change in pulmonary function
  - Change in immune response

- Change in Health Care Utilization
  - Hospitalization
  - ED visits
  - Outpatient visits
  - Medication Use

- Change in Productivity
  - Change in academic performance
  - Change in missed school days
  - Change in missed work days

- Change in Quality of Life
  - Change in activity limitations
  - Change in symptom-days
  - Change in other health-related QoL

- Change in Asthma morbidity

With additional definitions and criteria
Intervention Definition

- **Home-based**
  - ≥ 1 home visit

- **Multi-component**
  - ≥ 2 components (environmental assessment, remediation, education)
  - ≥ 1 component towards home environment

- **Multi-trigger**
  - ≥ 2 potential asthma triggers
Home visit

• Effort to change the home environment
  ♦ Assessment
  ♦ Remediation
  ♦ Education
  ♦ +/- additional components

• Conducted by trained personnel
  ♦ Clinician or healthcare provider
  ♦ Community health worker
  ♦ Pest control professional
Multi-Trigger Defined

- Activities to reduce exposures to two or more environmental triggers/allergens that exacerbate asthma
  - Barriers such as allergen impermeable covers
  - Cleaning interventions/materials
  - Pest management
  - Home improvements
  - Moisture remediation
  - Education to reduce environmental tobacco smoke exposure
- Can be tailored to the environment or client sensitivities
Environmental Remediation Intensity

<table>
<thead>
<tr>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
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<tbody>
<tr>
<td>Environmental assessment</td>
<td>Dehumidifiers</td>
<td>New form of HVAC</td>
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<tr>
<td>Pillow and mattress covers</td>
<td>HEPA filters</td>
<td>Insulation</td>
</tr>
<tr>
<td></td>
<td>Vacuums</td>
<td>Re-roofing</td>
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<tr>
<td></td>
<td>Integrated pest management</td>
<td>Removal of water damaged materials</td>
</tr>
<tr>
<td></td>
<td>Minor repairs</td>
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Technology

CDC

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CDC Evaluation Framework

Steps

- Engage stakeholders
- Describe the program
- Gather credible evidence
- Justify conclusions
- Ensure use and share lessons learned

Standards

- Utility
- Feasibility
- Propriety
- Accuracy

Describe the program

Focus the Evaluation design

Gather credible evidence

Justify conclusions

Ensure use and share lessons learned

Engage stakeholders

Describe the program

Focus the Evaluation design

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Engage stakeholders

Describe the program

Focus the Evaluation design

Gather credible evidence

Justify conclusions

Ensure use and share lessons learned
Focus the Evaluation Design

- Evaluation purpose
- Users
- Uses
- Questions
- Methods
Key Questions Addressed by the CG Review

● Do multi-component home-based environmental interventions improve asthma morbidity?

● How does intervention intensity (# of home visits, type of remediation) influence effectiveness?

● What is the added benefit of interventions with additional non-environmental components (SM, SS, CC)?

● Is this intervention more effective for certain subpopulations?
CDC Evaluation Framework

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- Describe the program

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- Describe the program

Steps
- Engage stakeholders
- Describe the program
- Focus the Evaluation design
- Gather credible evidence
- Justify conclusions
- Ensure use and share lessons learned
- Describe the program
Gather Credible Evidence

- Sources of evidence
- Quality
- Quantity
- Logistics
- Indicators
Literature Search

- For the period 1966 – Feb. 2008

- Inclusion Criteria
  - English-language
  - Published or unpublished
  - Home based
  - Meets intervention definition
  - Evaluates $\geq 1$ outcome of interest

- Exclusion Criteria
  - Drug trials
  - Primary prevention
Databases

- MEDLINE
- Cochrane library
- CI NAHL
- PsychINFO
- Web of Science
- EMBASE
- ERIC
- Sociological Abstracts
Search Results: 1966–February 2008

Electronic and Hand Search Results: 10,806

- Duplicates: 660
- Excluded based on title/abstract: 9,374
- Articles not available: 12

Full Text Review: 760

- Articles excluded after full review: 728
- Studies with limited quality of execution: 9

Studies that met inclusion criteria: 32

- Studies included in analysis: 23
  - Children: 20
  - Children and adults: 2
  - Adults: 1
Study Results: Children
Quality of Life: Symptom Days

n=6 studies

<table>
<thead>
<tr>
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<th>(N)</th>
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<tbody>
<tr>
<td>Kercsmar</td>
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<tr>
<td>Evans</td>
<td>99 (1033)</td>
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<td>Krieger</td>
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<td>Morgan</td>
<td>04 (937)</td>
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<tr>
<td>Thyne</td>
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</table>

Overall Median Change: -0.8 days
(IQI: -0.9, -0.6)

Favors intervention

Absolute Mean Difference in Symptom Days/2 wk period
Healthcare Utilization Outcomes

Physical Environment
- Living spaces
- Structural gaps
- Moisture
- Overcrowding

Environmental Assessment

“Home Visits”

Education
(ranging from allergen avoidance measures to self-management)

Persons (households) with Asthma

Change in Asthma Knowledge, Attitudes, Skills

Change in Asthma Management Behaviors *

Change in levels Of asthma triggers
Allergens (i.e. dust mites, cockroach, mold)
Particulates
Tobacco Smoke
Viruses

Environmental Remediation

Change in Trigger Reduction Behaviors *

Change In Asthma Control *
Change in Use of Rescue Medications
Change in Asthma Exacerbations *

Change in Asthma Maintenance
(i.e., controller medications, asthma action plans)

Change in Clinical Interactions/Management*

Change in Asthma Control *

Change in Use of Rescue Medications

Change in Asthma Exacerbations *

Change in Asthma Management Behaviors *

Change in Health Care Utilization

Hospitalization

ED visits

Outpatient visits

Medication Use

Change in Health Care Utilization

Change in Productivity

Change in academic performance

Change in missed school days

Change in missed work days

Change in Quality of Life

Change in activity limitations

Change in symptom-days

Change in other health-related QoL

Change in Physiologic Measures

Change in pulmonary function

Change in immune response

Change in Asthma Maintenance
(i.e., controller medications, asthma action plans)

Change in symptom-days

Change in missed school days

Change in missed work days

Change in Asthma Exacerbations *

Change in Asthma Management Behaviors *

Change in Asthma Knowledge, Attitudes, Skills

Change in levels Of asthma triggers
Allergens (i.e. dust mites, cockroach, mold)
Particulates
Tobacco Smoke
Viruses

CDC

[Non-additional definitions and criteria]
Health Care Utilization: Acute Care Visits/yr*

n=10 studies

Overall Median Change: -0.57 visits/yr
(IQI: -1.71, -0.33)

Favors intervention

Mean Difference (absolute) in number of acute asthma visits/year

*Acute care visits = sum of hospital, ED, and unscheduled office visits
Productivity Outcomes

Physical Environment
- Living spaces
- Structural gaps
- Moisture
- Overcrowding

Environmental Remediation

“Home Visits”

Change in Asthma Knowledge, Attitudes, Skills

Persons (households) with Asthma

Change in levels Of asthma triggers
- Allergens (i.e. dust mites, cockroach, mold)
- Particulates
- Tobacco Smoke
- Viruses

Change in Asthma Management Behaviors *

Change in Asthma Control *

Change in Use of Rescue Medications

Change in Asthma Exacerbations *

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Asthma Management Behaviors *

Change in Clinical Interactions/Management*

Change in Asthma Control *

Change in Use of Rescue Medications

Change in Asthma Exacerbations *

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Asthma Management Behaviors *

Change in Clinical Interactions/Management*

Change in Quality of Life
- Change in activity limitations
- Change in symptom-days
- Change in other health-related QoL

Change in Physiologic Measures
- Change in pulmonary function
- Change in immune response

Change in Productivity
- Change in missed school days
- Change in missed work days
- Change in asthma morbidity

Change in Productivity
- Hospitalization
- ED visits
- Outpatient visits
- Medication Use

Change in attending Clinical Interactions/Management*

Change in Use of Rescue Medications

Change in Asthma Exacerbations *

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Asthma Management Behaviors *

Change in Clinical Interactions/Management*

Change in Quality of Life
- Change in activity limitations
- Change in symptom-days
- Change in other health-related QoL

Change in Physiologic Measures
- Change in pulmonary function
- Change in immune response

Change in Productivity
- Hospitalization
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Change in Asthma Exacerbations *

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Asthma Management Behaviors *

Change in Clinical Interactions/Management*

Change in Quality of Life
- Change in activity limitations
- Change in symptom-days
- Change in other health-related QoL

Change in Physiologic Measures
- Change in pulmonary function
- Change in immune response

Change in Productivity
- Hospitalization
- ED visits
- Outpatient visits
- Medication Use

Change in attending Clinical Interactions/Management*

Change in Use of Rescue Medications

Change in Asthma Exacerbations *

Change in Asthma Maintenance (i.e., controller medications, asthma action plans)

Change in Asthma Management Behaviors *

Change in Clinical Interactions/Management*

Change in Quality of Life
- Change in activity limitations
- Change in symptom-days
- Change in other health-related QoL

Change in Physiologic Measures
- Change in pulmonary function
- Change in immune response
Productivity: School Days Missed/Year

n=5 studies

Overall Median Change: -12.3 days
(IQI: -24.7, -6.5)

Author (N)

Hughes, 01 (95)
Morgan, 04 (937)
Oatman, 07 (64)
Shelledy, 05 (18)
Somerville, 00 (114)

Favors intervention

Mean number of school days missed/year

(CDC)
Physiologic Outcomes

- Change in Asthma Knowledge, Attitudes, Skills
- Change in Asthma Management Behaviors *
- Change in Asthma Control *
- Change in Use of Rescue Medications
- Change in Asthma Exacerbations *
- Change in Asthma Maintenance (i.e., controller medications, asthma action plans)
- Change in Asthma Management Behaviors *
- Change in Clinical Interactions/Management*
- Change in trigger reduction behaviors *
- Change in levels of asthma triggers
  - Allergens (i.e. dust mites, cockroach, mold)
  - Particulates
  - Tobacco Smoke
  - Viruses
- Environmental Remediation
- "Home Visits"
- Environmental Assessment
- Education (ranging from allergen avoidance measures to self-management)

- Change in Asthma Exacerbations *
- Change in symptom-days
- Change in missed school days
- Change in missed work days
- Change in quality of life
  - Change in activity limitations
  - Change in symptom-days
  - Change in other health-related QoL

- Change in Health Care Utilization
  - Hospitalization
  - ED visits
  - Outpatient visits
  - Medication Use

- Change in Productivity
  - Change in academic performance
  - Change in missed school days
  - Change in missed work days

- Change in Quality of Life
  - Change in activity limitations
  - Change in symptom-days
  - Change in other health-related QoL

- Change in Physiologic Measures
  - Change in pulmonary function
  - Change in immune response

Persons (households) with Asthma

- Physical Environment (Home)
  - Living spaces
  - Structural gaps
  - Moisture
  - Overcrowding

- Change in Asthma Knowledge, Attitudes, Skills
- Change in Asthma Management Behaviors *

- Change in Health Care Utilization
  - Hospitalization
  - ED visits
  - Outpatient visits
  - Medication Use

- Change in Productivity
  - Change in academic performance
  - Change in missed school days
  - Change in missed work days

- Change in Quality of Life
  - Change in activity limitations
  - Change in symptom-days
  - Change in other health-related QoL

- Change in Physiologic Measures
  - Change in pulmonary function
  - Change in immune response

* Additional definitions and criteria
Physiologic Outcomes

(n= 7 studies)

- All with different measurements
- Two studies showed significant improvement in pulmonary function
- Overall, no significant improvement
Summary of Outcomes in Children

- Health care utilization
  - Acute care visits reduced by 0.57 visits/year

- Quality of Life
  - Asthma symptom days reduced by 21 days/year

- Productivity
  - School days missed due to asthma reduced by 12.3 days/year

- Physiology
  - No significant improvement in pulmonary function or immunologic response
## Summary of Outcomes in Adults

<table>
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<tr>
<th>Outcome</th>
<th>No. of Studies</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Quality of Life</td>
<td>2</td>
<td>Improvement in QoL scores</td>
</tr>
<tr>
<td>Health Care Utilization</td>
<td>1</td>
<td>Reduction in acute care visits</td>
</tr>
<tr>
<td>Productivity</td>
<td>1</td>
<td>No improvement</td>
</tr>
<tr>
<td>Physiology</td>
<td>0</td>
<td>Not Reported</td>
</tr>
</tbody>
</table>
CDC Evaluation Framework

Steps
- Engage stakeholders
- Describe the program
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- Justify conclusions
- Ensure use and share lessons learned

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- Utility
- Feasibility
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- Accuracy

Steps:
- Describe the program
- Focus the Evaluation design
- Gather credible evidence
- Justify conclusions
- Ensure use and share lessons learned
- Engage stakeholders
Justifying Conclusions

- Use appropriate methods of analysis
- Interpret the significance of results
- Make judgments according to clearly stated values that classify a result
- Recommend actions or decisions that are consistent with the conclusions
Task Force Recommendation for Children and Adolescents

The Task Force recommends the use of home-based multicomponent, multi-trigger environmental interventions for children and adolescents with asthma on the basis of strong evidence of effectiveness in reducing symptom days, improving quality of life or symptom scores, and reducing the number of school days missed.
Task Force Recommendation for Adults

The Task Force found insufficient evidence to determine the effectiveness of home-based multicomponent, multi-trigger environmental interventions in adults with asthma due to a small number of studies with inconsistent results.
Additional Findings
Number of Home Visits

- 1: 3 studies
- 2-4: 8 studies
- 5-7: 6 studies
- 8-10: 3 studies
- >10: 3 studies

Number of home visits
Remediation Intensity

Number of Studies

Range of Remediation

None
Minor
Moderate
Major
Studies with ETS Data

Type of ETS Data

- Any ETS Info: 21
- House with Smoker: 18
- Cessation: 7
- ETS Ed: 9

Number of Studies
Economic review

- Economic review of these interventions – completed 2009

- The Task Force found that home interventions with the combination of minor to moderate environmental remediation with an educational component provide good value for the money invested

- The economic benefits from these interventions have the potential to match or even exceed the cost of interventions

- For additional information on the economic review
  Tursynbek Nurmagambetov, PhD, Economist, CDC

  Email: ten7@cdc.gov
Additional Benefits

- Improved caregiver support
- Caregiver smoking cessation
- Health benefits for parents and siblings of study children
- Home visit identifies additional public health concerns in the home
Challenges/Barriers to Implementation

- Expense of interventions to participant - major remediation
- Remodeling may increase triggers and worsen asthma/allergies
- Acceptability of home visit - privacy issues
- Insurance issues
- Sustainability
CDC Evaluation Framework

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Describe the program

Gather credible evidence

Focus the Evaluation design

Justify conclusions

Engage stakeholders

Ensure use and share lessons learned
Ensure Use and Share Lessons Learned

- Resource for partners to improve asthma control
- Dissemination of results
- Diversity of studies
- Diversity of study participants
- Applicability
Applicability

- **Countries:**
  - **United States** (18), UK (3), Canada (1), Japan (1)

- **Setting**
  - Urban/inner city (17)
  - Rural (2)
  - Unspecified (4)

- **Client Population**
  - Adult (1); **Children** (21); Both (2)
  - **Majority African-American** (10), White (6), Hispanic (6), Asian (1)
  - **Low income** (21); Not specified (2)

- **Implementing Organizations**
  - Hospitals (4); clinics (6); community health centers (6); **mixed** (7)
Uses of this Systematic Asthma Review

- **Public Health Programs**
  - Identify effective interventions to fund/implement
  - Findings posted on CG and the CDC Asthma websites

- **Health practitioners/researchers**
  - Communicate/translate research
  - Identify key research gaps

- **Policy Development**
  - Develop practice recommendations (housing, insurance etc.)
Future Directions of Research

- Determine the added benefit of conducting in-home intervention

- Ideal population for this intervention
  - Frequent users of health care services?
  - Participants with more severe asthma?

- Determine impact of secondhand smoke

- Need more studies in adults

- Article publication in AJ PM-near future
Conclusion

**Children and adolescents** with asthma

Home-based multi-trigger, multi-component, environmental interventions are effective in reducing

- symptom days
- missed school days
- acute asthma visits

**Adults** with asthma

Insufficient evidence
Additional Resources

- Community Guide Asthma Recommendation
  http://www.thecommunityguide.org/asthma/multicomponent.html

- Air Pollution and Respiratory Health Branch
  http://www.cdc.gov/asthma/

- For additional information on the effectiveness review

Deidre Crocker, MD, Epidemiologist, Coordinating scientist, CDC
Email: dvj4@cdc.gov

Gema Dumitru, MD, MPH, ORISE fellow, CDC
Email: ggd7@cdc.gov
Thank you!
Questions
Thank you for joining us!

- Please provide your feedback using the Question and Answer pane.

- Archive of this Webinar will be posted to: www.AsthmaCommunityNetwork.org

- Continue the discussion! Visit the forums: www.AsthmaCommunityNetwork.org/Forums

- Save the Date! Next Webinar: Dec. 3, 2009

Economic Evaluation of Home-Based Environmental Interventions
Additional slides
Other Evidence Based Reviews

- Agency for Healthcare Research Quality
  - Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies. Volume 5: Asthma Care
  - Released January, 2007
  - Evaluates nine asthma interventions
AHRQ Review Interventions

1. Patient or caregiver education
2. Self-monitoring or self management (children and adults)
3. Organizational change
4. Audit and feedback
5. Provider reminders
6. Patient reminders
7. Facilitated relay of clinical data to providers
8. Financial, regulatory, or legislative incentives
9. Healthcare provider education
Other Evidence Based Reviews-Continued

- Asthma Health Outcomes Project (AHOP)
  - Funded by EPA in 2006
  - Reviewed 111 asthma programs
  - Included local and community based programs
  - Did not evaluate study quality
Reviews of Environmental Interventions

● Environmental Change as a Strategy for Asthma
  ◆ Single Allergen Interventions (Not Effective)
    ■ Impermeable covers, air filters, chemical methods not effective alone
      [Mills, Woodcock (Cochrane, 2008)]

  ◆ Multi-trigger Environmental Remediation (Mixed Results)
    ■ Custovic et al (1998)- Avoidance of moisture, pets, and carpeting shows promise in reducing symptoms

    ■ Chapman (2005)- Multi-trigger interventions appear improve health, but depend on study design and patient sensitivities
Reviews of Environmental Interventions- Cont

● Home as a Setting for Interventions
  ◆ Home Visits (Effective)
    ■ Sweet (2004)- Home visits beneficial, but vary widely in design; more evidence needed

◆ Multi-component Interventions (Effective)
  ■ Wu et al (2007), Sandel- Improve health and are cost-effective, but value of each component unknown
Intervention Components

1. **Environmental Assessment (EA)**
   - In-home written assessment of environmental triggers that exacerbate asthma

2. **Environmental Remediation (ER)**
   - Actions conducted or financed to reduce triggers in the home that exacerbate asthma
     - Major Remediation - large structural changes
     - Minor remediation - small additions

3. **Environmental Education (EE)**
   - Patient education regarding actions to reduce triggers in the home that exacerbate asthma
4. **Self-Management Education (SM)**
   - Patient education on monitoring symptoms and taking action to modify treatment.
   - Must include two or more of the following elements: written action plan; regular medical review; self monitoring of peak expiratory flow or symptoms; asthma education

5. **Asthma Education (AE)**
   - General education regarding the definition, pathophysiology, and treatment of asthma without a SM component

6. **Social Services (SS)**
   - Services to improve access to medical care or to advocate for environmental remediation

7. **Case Management (CM)**
   - Services to improve coordination of asthma care between health care providers and home health workers
Single-Allergen/Single-Component (SA/SC) Interventions Excluded

- SA/SC interventions Excluded because
  - Proven not effective (several systematic reviews)
  - Not aimed at our target population
    - > 60% of people with atopic asthma allergic to > 1 allergen
    - Broader intervention likely to benefit a larger population
  - Not conducive for community setting
    - Single allergen interventions need skin or RAST testing for sensitization which is difficult in a community setting
One Lump/ Split Concern

- How to incorporate evidence from studies including self-management training (SM)
  - Primary focus of SM is improving asthma management behaviors
  - These strategies may lead to an improvement in the patient’s asthma (independently of environmental changes)
  - Frequently include environmental education
  - Are these interventions two different
Percentage of Population with Asthma Acute Care Visits by Component

(n = 11 studies)

Overall Median Change: -5.4 pct pt
(IQI: -19.2, -1.6)

- Environmental Only
  Median Change = +3.8 pct pt

- Environmental + Other Components
  Median Change = -11.2 pct pt

Eggleston, 05 (100)
Morgan, 04 (937)
Brown, 02 (129)
Hughes, 01 (95)
Kercsmar, 06 (62)
Krieger, 05 (274)
Krieger, 09 (309)
Parker, 07 (328)
Evans, 99 (1033)

Percent change (absolute) of population with ≥1 asthma acute care visit
Percent Change in Symptom/Quality of Life Score by Component

(n = 8 studies)

Overall Median Change: 4%
(Range: +1, +17)

Environmental Only
Median Change = 5%
P = 0.005

Environmental + Other Components
Median Change = 4%
P = 0.049

P = 0.17
P = NS
P = 0.049
P = 0.67

Percent change (relative) in quality of life or symptom score
Quality of Life: Symptom/Quality of Life Score

(n = 5 studies)

Overall Median Change: 4 %
(Range: +1, +17)

<table>
<thead>
<tr>
<th>Study (N)</th>
<th>Major Remediation</th>
<th>Minor Remediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barton, 07 (81)</td>
<td>P=0.17</td>
<td>Median= 7 %</td>
</tr>
<tr>
<td>Krieger, 09 (309)</td>
<td>P=0.049</td>
<td>Median= 3.5 %</td>
</tr>
<tr>
<td>Eggleston, 05 (100)</td>
<td>P= NS</td>
<td></td>
</tr>
<tr>
<td>Krieger, 05 (274)</td>
<td>P=0.005</td>
<td></td>
</tr>
<tr>
<td>Klinnert, 07 (181)</td>
<td>P=0.67</td>
<td></td>
</tr>
</tbody>
</table>

Percentage change (relative) in quality of life or symptom score
## Environmental Tobacco Smoke (ETS)

<table>
<thead>
<tr>
<th>Measurement</th>
<th># of studies</th>
<th>% Median (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studies including ETS measures</td>
<td>14/25</td>
<td>-</td>
</tr>
<tr>
<td>Measured caregivers who smoke</td>
<td>12/25</td>
<td>40 (21 to 73)</td>
</tr>
<tr>
<td>Smoking cessation counseling</td>
<td>13/25</td>
<td></td>
</tr>
<tr>
<td>Quit smoking</td>
<td>7/13</td>
<td>-5 (+3 to -19.5)</td>
</tr>
<tr>
<td>Changed smoking habits</td>
<td>4/13</td>
<td>+2.9 (-5.8 to +13.3)</td>
</tr>
</tbody>
</table>
## Physiologic Outcomes Reported in the Included Studies

(n=7 studies)

<table>
<thead>
<tr>
<th>Study</th>
<th>Physiologic Measure</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggleston, 2005</td>
<td>FEV 1</td>
<td>No change</td>
</tr>
<tr>
<td>Hughes, 2001</td>
<td>FEV1, FEV1/ FVC, RV/ TLC, exp flow 25% 50%, peak flow</td>
<td>No change except for exp flow at 25% and 50% improved significantly</td>
</tr>
<tr>
<td>Morgan, 2004</td>
<td>FEV1, FVC, peak flow</td>
<td>No change</td>
</tr>
<tr>
<td>Parker, 2007</td>
<td>FEV1, FVC</td>
<td>FEV1 and FVC improved significantly</td>
</tr>
<tr>
<td>Barton, 2007</td>
<td>FEV1/ FVC and peak flow</td>
<td>No change</td>
</tr>
<tr>
<td>Williams, 1999</td>
<td>IgE levels</td>
<td>Trend downward but NS</td>
</tr>
<tr>
<td>Klinnert, 2007</td>
<td>FEV 0.5, FVC, FEV0.5/ FVC</td>
<td>Trend towards improvement but NS</td>
</tr>
</tbody>
</table>
Health Care Utilization: Percentage of Children with Acute Care Visits by # of home visits

(n = 9)

Percentage change (absolute) of children with ≥1 asthma acute care visit
Quality of Life: Mean Symptom Days by # of home Visits

n = 5 studies

- Study (N)
  - Krieger, 05 (7-9)
  - Krieger, 09 (7-9)
  - Morgan, 04 (4-6)
  - Kercsmar, 06 (2-3)
  - Evans, 99 (1)

Absolute Mean Difference in Symptom Days/2 wk period

Favors intervention
Impact of the Home Visit: Carter, 2001

- Individual RCT (Atlanta, GA)
- Population: 104 children (ages 5–16) with asthma
- Intervention group: 4 home visits over 1 year (EA, ER, EE)
- Placebo group: 4 home visits over 1 year (EA, ineffective ER)
- Control group: usual care (no home visits)

<table>
<thead>
<tr>
<th>Group</th>
<th>Total # acute care visits/yr</th>
<th>Baseline</th>
<th>1yr</th>
<th>Difference</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>51</td>
<td>34</td>
<td>-17</td>
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<tr>
<td>Placebo</td>
<td>64</td>
<td>45</td>
<td>-19</td>
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<tr>
<td>Control</td>
<td>45</td>
<td>48</td>
<td>+3</td>
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</table>

\[ P \leq 0.001 \]

\[ \text{NS} \]
Healthy Homes Initiative

● Expert Panel looking at 5 subjects including asthma
  ◆ Interior Biological Agents*
  ◆ Interior Chemical Agents
  ◆ External Exposures (drinking water)
  ◆ Structural Deficiencies
  ◆ Intersection between House and Community (zoning, location)

● Panel Meeting held in December, 2007

● 3 consultants in the CG review also in this panel*
Single-Allergen/Single-Component (SA/SC) Interventions Excluded

- SA/SC interventions Excluded because
  - Proven not effective (several systematic reviews)
  - Not aimed at our target population
    - > 60% of people with atopic asthma allergic to > 1 allergen
    - Broader intervention likely to benefit a larger population
  - Not conducive for community setting
    - Single allergen interventions need skin or RAST testing for sensitization (difficult in a community setting)
## Combinations of Interventions-CT’s

<table>
<thead>
<tr>
<th>Study</th>
<th>Home Visit</th>
<th>Env Edu</th>
<th>Env Asses</th>
<th>Env Rem</th>
<th>Self-Mge</th>
<th>Asthma Edu</th>
<th>Social Srvcs</th>
<th>Case Mge</th>
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<tbody>
<tr>
<td>Barton, 2007</td>
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<td>Morgan, 2004</td>
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<td>Carter, 2001</td>
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<td>Evans, 1999</td>
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</table>

*ER was by parent  **Home Visit financed but not conducted by study  *** EE very minor
## Combinations of Interventions- Before/After Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Home Visit</th>
<th>Env Edu</th>
<th>Env Asmt</th>
<th>Env Rem</th>
<th>Self-Mge</th>
<th>Asthma Edu</th>
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<td>Levy, 2006</td>
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</tbody>
</table>
Describe the Program (cont.)

- Nine priority interventions
  - Trigger reduction
  - Self Management for children
  - Self Management for adults
  - Systems Change
  - School Interventions
  - Provider Education
  - Air Quality Alerts
  - Diesel Exhaust
  - Case identification

- Why home-based interventions?