Environmental Action for Children's Health

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Abstract

Environmental Action for Children's Health (EACH) is a home inspection and modification program for children with asthma in the greater Minneapolis and St. Paul metropolitan area. Concerns that may contribute to asthma exacerbations are identified, recommendations for modification made, some products are provided (bed encasements, HEPA vacuum cleaners, dehumidifiers, air cleaners) and minor repairs (plumbing leaks, caulking) are made. Asthma care management modifications (medication Changes, revised asthma action plans) are coordinated with the child's Health care provider. Some structural modifications (removal of sheet Rocking, etc) are also occasionally made. Referrals to other environmental Programs are made as needed. Health care utilization, school absences and symptom burden are measured at baseline and 3, 6, 9, and 12 months. significant improvements in daytime and nighttime symptoms and functional limitations ($p<0.05$) have been noted; hospitalizations, emergency department admissions and oral corticosteroid treatment showed significant differences from baseline and there was a significant decline in school absences. Residents and their physicians indicate that the program has filled unmet needs with a service previously lacking in asthma care management.

EACH Activities

- Referral from physicians, school nurses, other providers, self
- Assessment of home environment focusing on issues that may contribute to asthma
- Assessment of health of child and review of asthma management

The end result of a home assessment is an Environmental Asthma Action Plan

Who is being served

- By asthma severity:
  - 7% mild intermittent asthma
  - 34% mild persistent asthma
  - 50% moderate persistent asthma
  - 9% severe
- 66% live in rental properties
- Average age = 8.2 yrs

Baseline Measures

At baseline, children living in these homes had on average:

- 0.5 hospitalizations
- 1.1 ED visits
- 1.4 episodes of oral prednisone use
- 7.0 missed days of school

during the 3 months prior to their home assessment.

Home Assessments

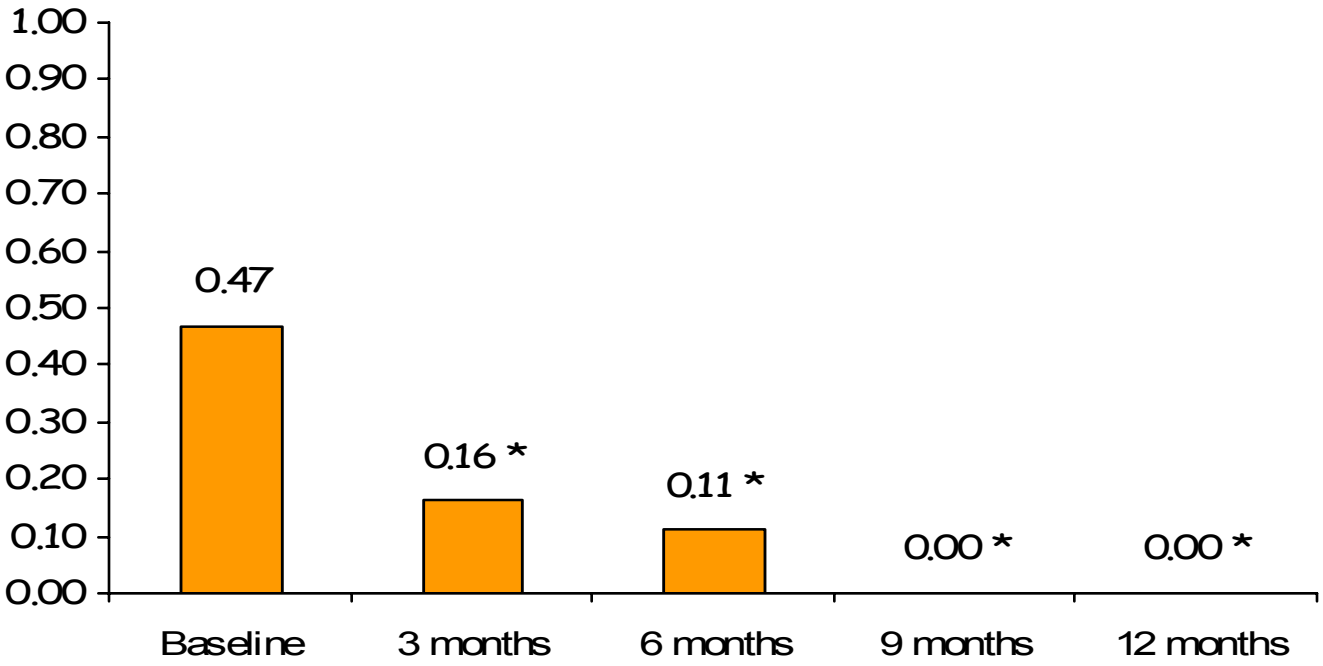
- Most commonly identified problems
  - Pets -Smoking -Cleanliness
- Most commonly provided products
  - Vacuum -Air cleaner -Bed encasements
  - CO and smoke detectors
- Most common structural modifications
  - Sheet rock removal -Caulking
  - Correction of ventilation problems

Change in Mean Number of Hospitalizations due to Asthma

- There were decreases in the mean number of asthma related hospitalizations at all follow-up visits
  - Baseline: 0.47 visits
  - 3 months: 0.16 visits*
  - 6 months: 0.11 visits*
  - 9 months: 0.00 visits*
  - 12 months: 0.00 visits*

(* significant declines from baseline $p \leq 0.05$)

Change in Mean Number of Hospitalizations due to Asthma



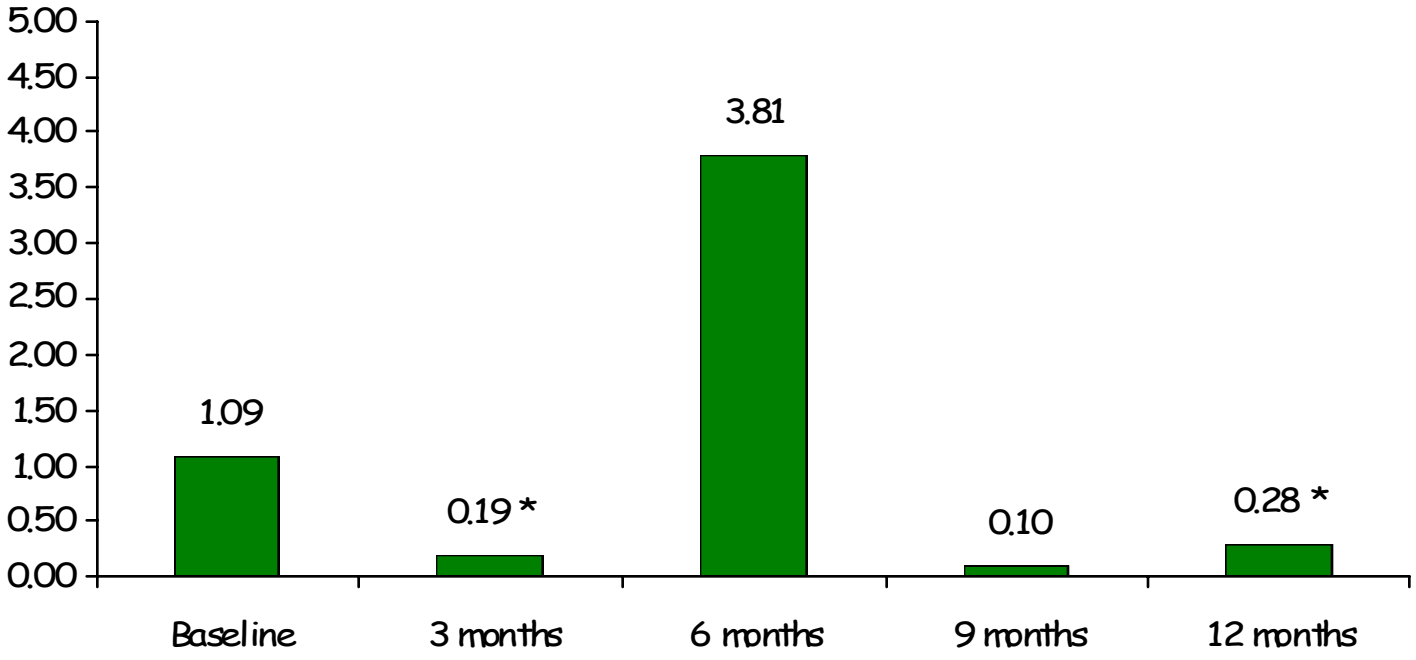
(* significant declines from baseline $p \leq 0.05$)

Change in Mean Number of Emergency Department Visits Due to Asthma

- There were decreases in the mean number of asthma related emergency department visits at 3 and 12 months.
  - Baseline: 1.09 visits
  - 3 months: 0.19 visits*
  - 6 months: 3.81 visits
  - 9 months: 0.10 visits
  - 12 months: 0.28 visits*

(* significant declines from baseline $p \leq 0.05$)

Change in Mean Number of Emergency Department Visits Due to Asthma



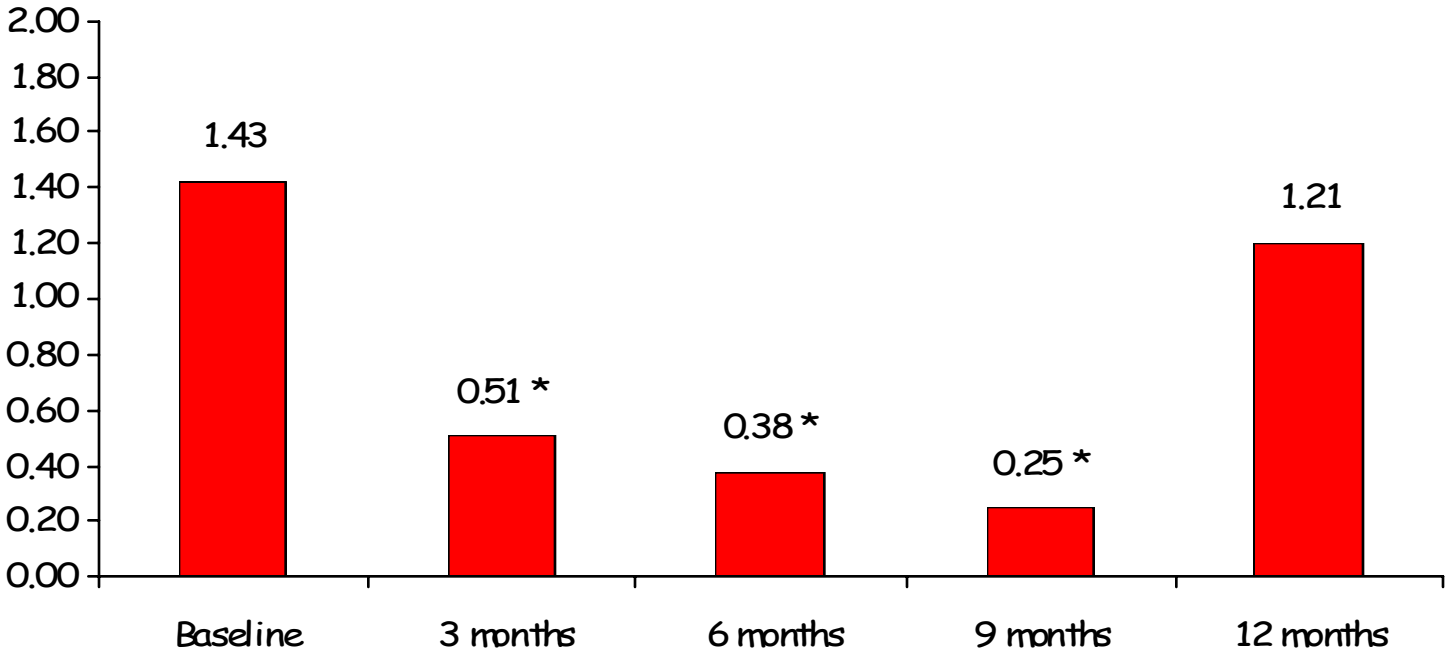
(* significant declines from baseline $p \leq 0.05$)

Change in Mean Number of Uses of Oral Corticosteroids

- There were decreases in the mean number of uses of oral corticosteroids at the 3, 6 and 9 month follow-up visits
  - Baseline: 1.43 regimens
  - 3 months: 0.51 regimens*
  - 6 months: 0.38 regimens *
  - 9 months: 0.25 regimens*
  - 12 months: 1.21 regimens

(* significant declines from baseline $p \leq 0.05$)

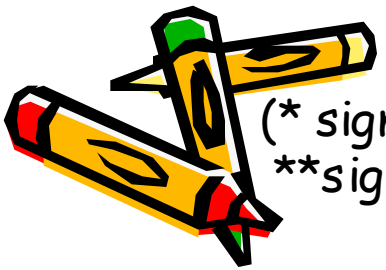
Change in Mean Number of Uses of Oral Corticosteroids



(* significant declines from baseline $p \leq 0.05$)

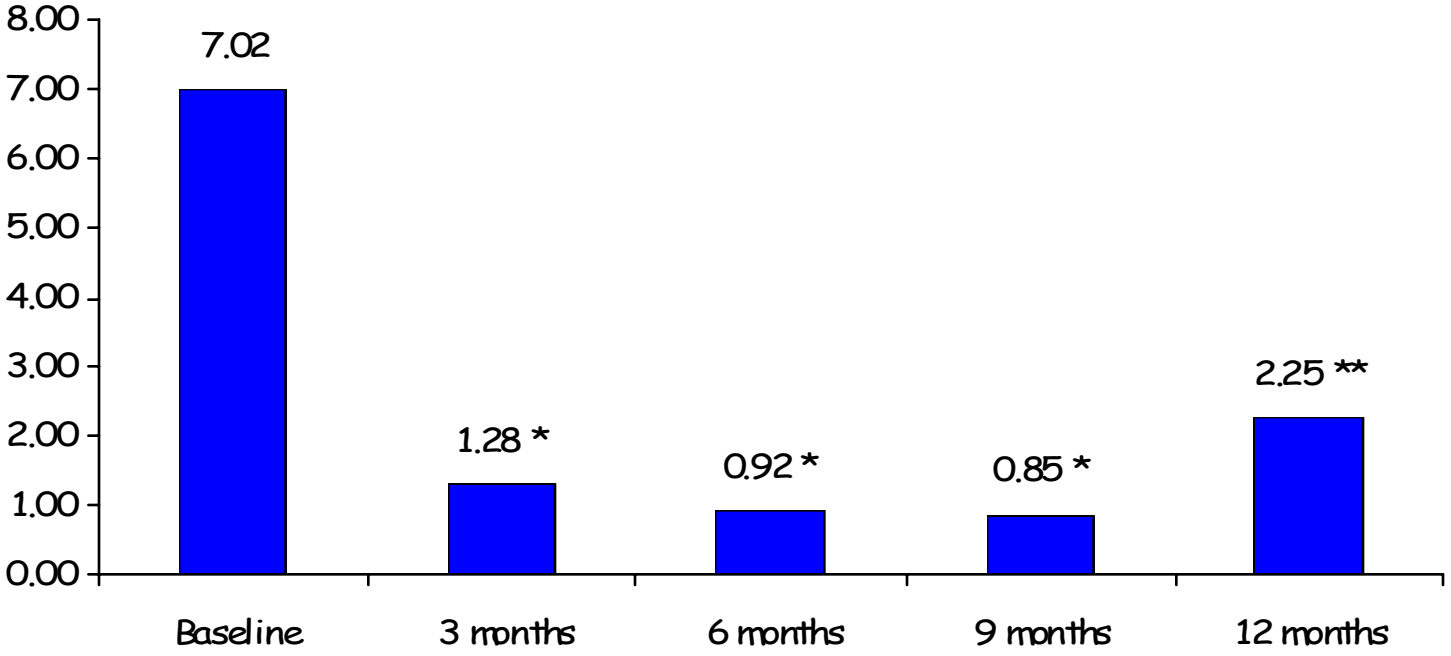
Change in Mean Number of Days of School Missed Due to Asthma

- There were decreases in the mean number of school absences at all follow-up visits
  - Baseline: 7.02 days
  - 3 months: 1.28 days*
  - 6 months: 0.92 days*
  - 9 months: 0.85 days*
  - 12 months: 2.25 days**



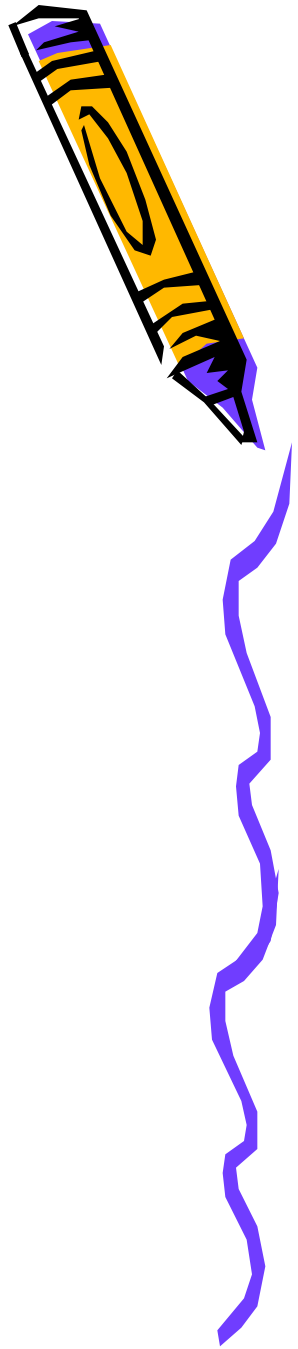
(* significant declines from baseline $p \leq 0.05$;
**significant decline from baseline at $p \leq 0.10$)

Change in Mean Number of Days of School Missed Due to Asthma



(* significant declines from baseline p ≤ 0.05;
** significant decline from baseline p ≤ 0.10)

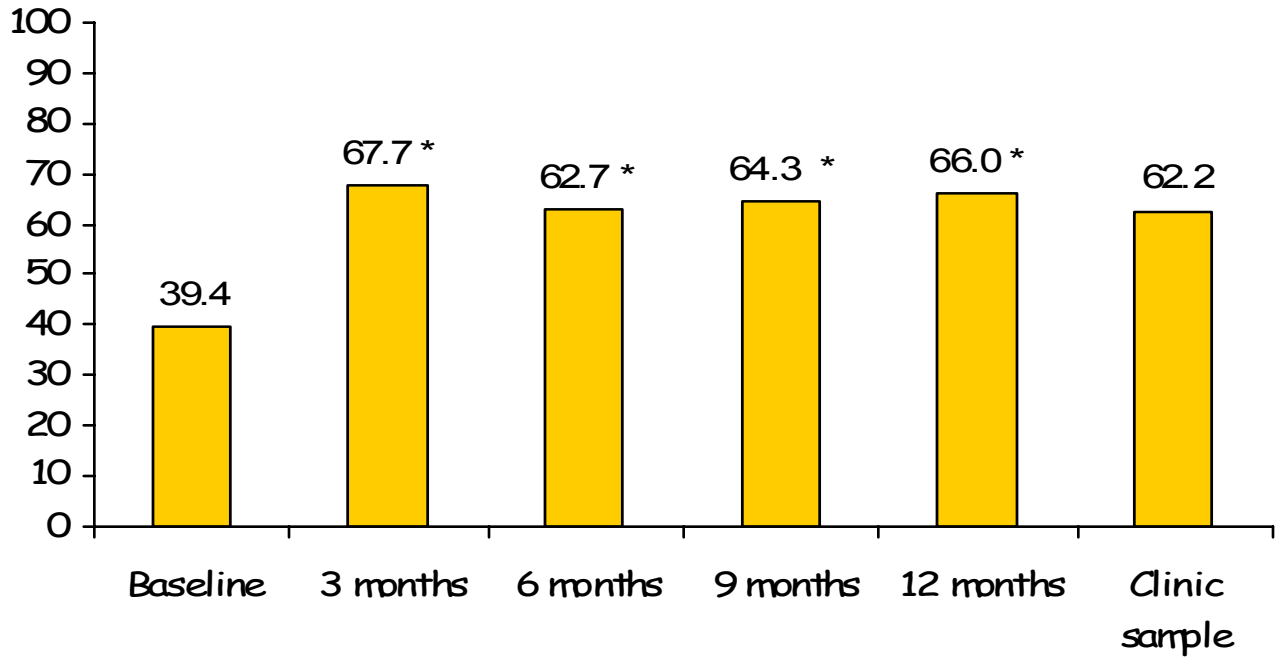
Change in Asthma Symptom Burden



- Daytime Symptoms
  - Baseline: 39.4 ± 21.7
  - 3 months: 67.7 ± 22.2*
  - 6 months: 62.7 ± 24.2*
  - 9 months: 64.3 ± 26.0*
  - 12 months: 66.0 ± 24.8*

(* significant improvement from baseline $p \leq 0.05$)

Change in Mean Daytime Symptom Burden Score



Higher scores = less symptom burden

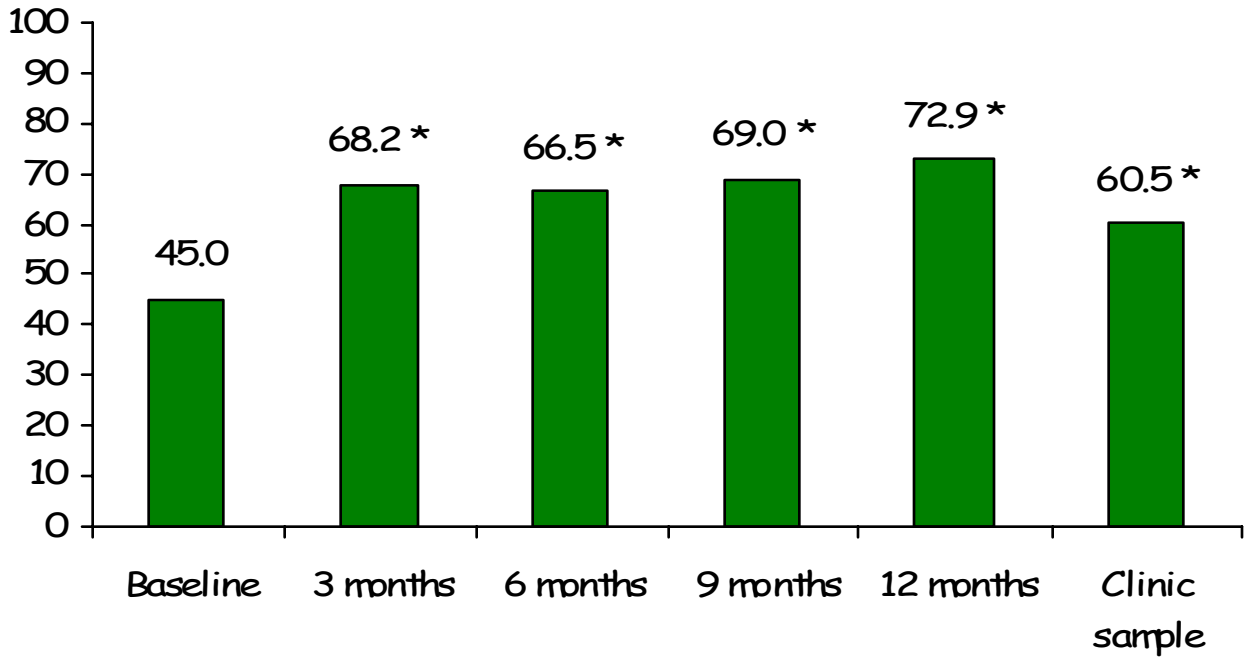
* Significant improvement from baseline ($p \leq 0.05$)

Change in Asthma Symptom Burden

- Nighttime Symptoms
  - Baseline: 45.0 ± 29.2
  - 3 months: 68.2 ± 26.3*
  - 6 months: 66.5 ± 24.8*
  - 9 months: 69.0 ± 28.1*
  - 12 months: 72.9 ± 27.8*

(* significant improvement from baseline $p \leq 0.05$)

Change in Mean Nighttime Symptom Burden Score



Higher scores = less symptom burden

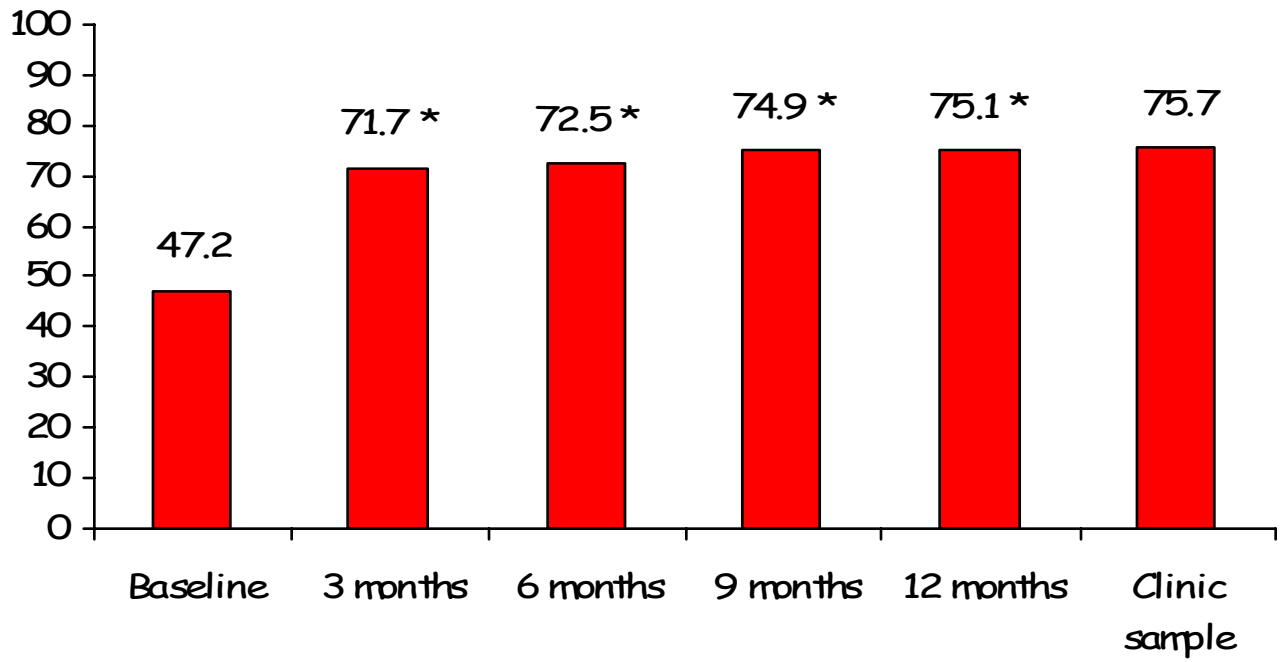
* Significant improvement from baseline ($p \leq 0.05$)

Change in Asthma Symptom Burden

- Functional Limitations
  - Baseline: 47.2 ± 25.4
  - 3 months: 71.7 ± 25.4*
  - 6 months: 72.5 ± 20.9*
  - 9 months: 74.9 ± 24.6*
  - 12 months: 75.1 ± 25.4*

(* significant improvement from baseline $p \leq 0.05$)

Change in Mean Functional Limitation Score



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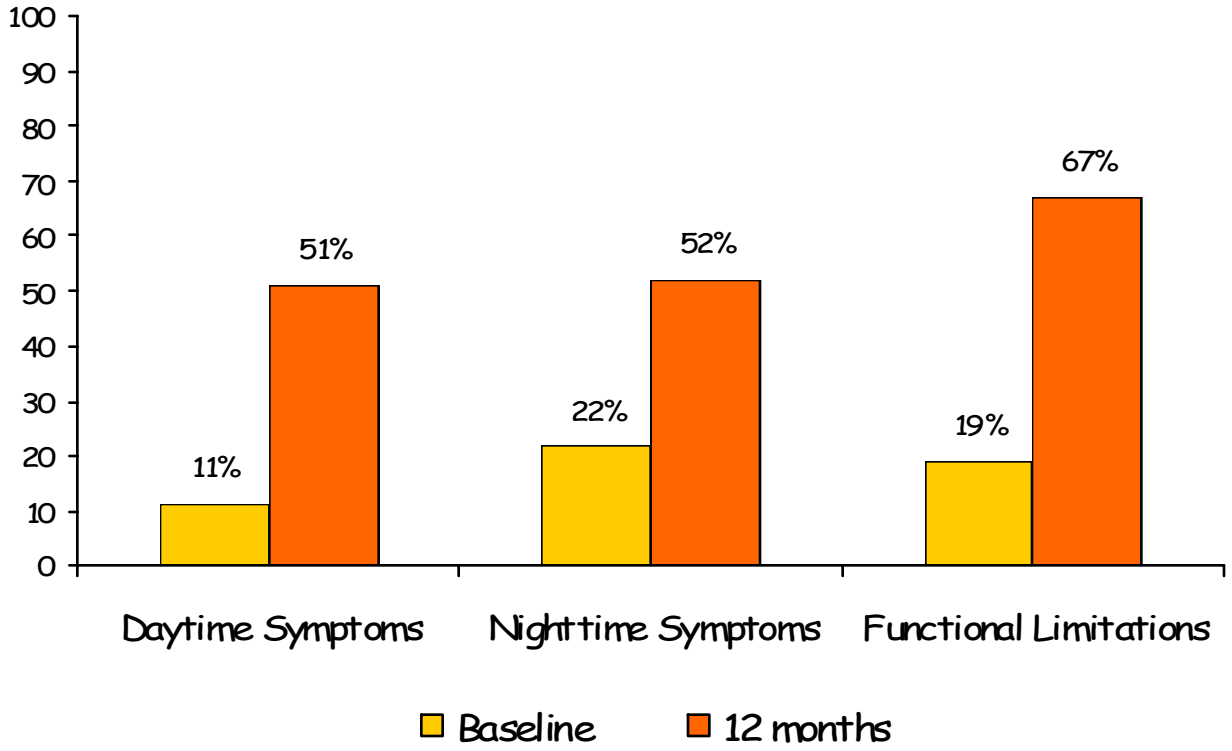
* Significant improvement from baseline ($p \leq 0.05$)

Symptom Improvement
% Scoring ≥ 75



Intervention Costs

- Average cost of products and program delivery was $764
  - In homes where only product was delivered, average cost of products and intervention delivery was $468
  - In homes with structural modifications and products, average cost of modifications, products and intervention delivery was $1060

Products provided

HEPA vacuum cleaner
HEPA air cleaner
Bed encasements (pillow and mattress)
CO and/or smoke detectors

Structural modifications made

Installation of venting fans
Sheet rock removal/disposal
Caulking
Minor plumbing repairs
Carpeting removal/disposal

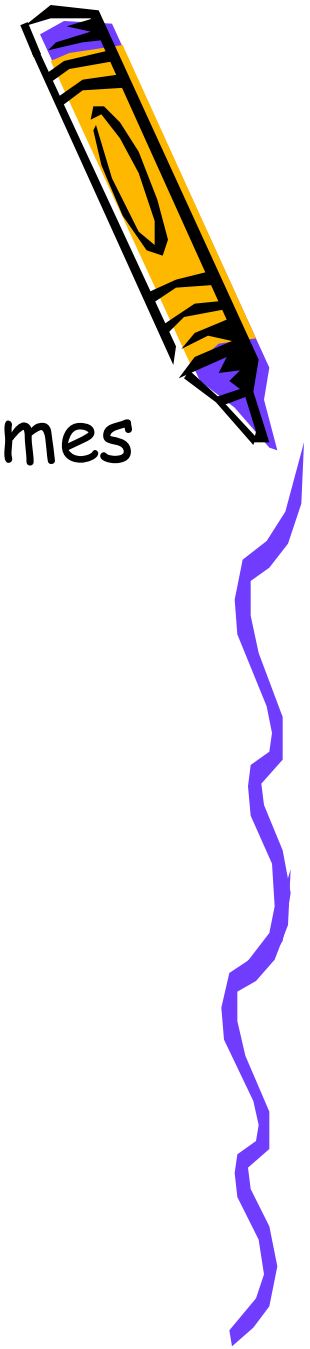
Other Impacts

- Education and outreach of health professional
- Education about general housekeeping and home maintenance
- Smoking behavior recommendations
- Empowerment of residents
- Resident-initiated home improvement projects

Participant and Physician Impressions

- Provides an essential service to low income children with asthma and their families.
- In-home products to help control asthma would not be available otherwise.
- Extra teaching and support to manage the child's asthma

Modification Sustainability



- No products reported missing in the homes
- Few reports of non-use of provided products
- Minor problems with products that are used.

Some Lessons Learned

- A wide net for referrals is needed
- Return communications to physician offices is a required courtesy
- Focus on the child's bedroom rather than the whole house
- An intervention team (medical provider and environmental specialist) provides more comprehensive services
- Access to a full complement of social services is necessary

One Family's Experience

- Child was referred by a school nurse because of too many missed days of school related to asthma

- Environmental Asthma Action Plan completed
  - Home was referred for lead hazard
  - No furniture so referral made to HouseCalls
  - Insurance issues were referred to state public programs
  - No medications, appointment was made with primary care physician for medications and an asthma action plan.

- Follow-up visit completed
  - Education provided for proper inhaler technique
  - Referral to specialist care by primary care physician, visit was arranged
  - Products were provided to improve home environment

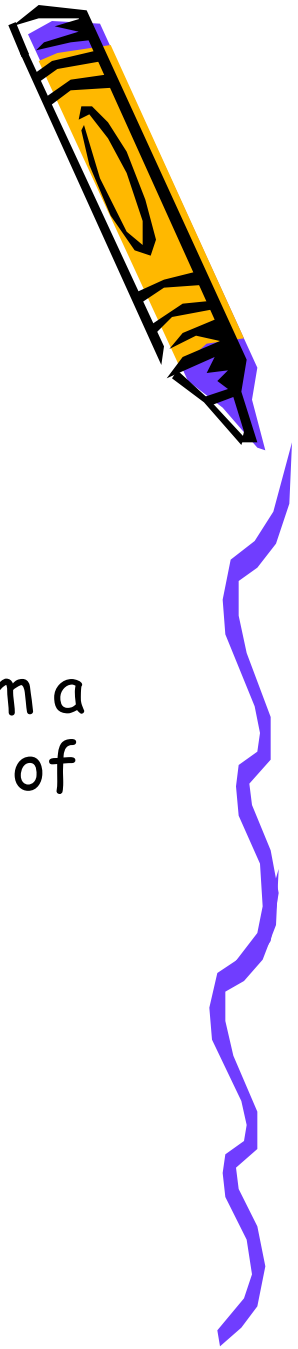
Conclusion

A home environmental program such as the EACH program has demonstrated a positive influence on the home environment of children resulting in:

- Decreased hospitalizations for asthma
- Decreased emergency department admissions
- Decreased use of oral corticosteroids
- Decreased school absences
- Improved asthma symptom burden

at an overall cost savings relative to program delivery.

Next Steps



- Additional HUD funding will allow for us to increase program reach

- Further data analysis with additional data from a similar program by the Minnesota Department of Health funded by EPA

Acknowledgements

- The Department of Housing and Urban Development
- The Center for Disease Control
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