

How to Evaluate a Home Environmental Assessment Program

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2015 Winner-
HUD Secretary's Award
for Healthy Homes



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The business case and data analysis is about helping people get better

It's about Jeremy



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Community Benefit

UNITY INVESTMENT

Fiscal Year 2018

And Community Investment: \$176,296,353

IS COMMUNITY BENEFIT?

At Children's Mercy Health, we invest in our community to ensure the region is healthy and vibrant. We invest in programs and services that improve the health and well-being of our patients, our community, and our region. We invest in our community to ensure the region is healthy and vibrant. We invest in programs and services that improve the health and well-being of our patients, our community, and our region.



Investment Category	Amount
COMMUNITY BENEFIT	\$176,296,353
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HCF

Providing leadership, education, and resources to a diverse family of providers and quality health care organizations and organizations.

MEASURING SUCCESS

Measuring success through various metrics and data analysis.

KEY CONCEPTS

Key concepts related to Safety Net Care and community investment.

Safety Net Care

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The cost of asthma is high

7.8% or >25 million people

\$81 billion annual health care costs
(direct and indirect)

Ethnic differences correlate with poverty,
urban air quality, indoor allergens,
inadequate medical care

Nurmagambetov, et. al. The Economic Burden of Asthma in the United States. Annals of American Thoracic Society, 2017

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NGA PAPER

Health Investments That Pay Off: Strategies for Addressing Asthma in Children



National Governor's Association White Paper recommends investing in home visits for asthma patients

"Asthma self-management strategies should be targeted to the intensity of patient's needs"

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How do we evaluate whether our asthma care efforts are helping patients?

What matters?

1. Keys to program development – what do you want to show?
Program impact – Patient outcomes, Financial outcomes
2. What has the greatest impact on asthma care costs?
Hospitalizations, ED visits, Urgent Care, Medications for some
3. To measure impact, calculate Return on Investment (ROI)
ROI = Input or investment vs. savings and health improvement

Can we utilize pilot projects to build a home visit model?

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To evaluate impact, use ROI

“Return on Investment” (ROI) is a process of using data about health care service costs for implementing a program compared to the savings from the impact the program has on the patients served.

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Why ROI?

- It helps with identifying the population served, cost drivers, and opportunities to improve quality while decreasing expenses
- It's useful for program design, resource allocation and funding, and for monitoring and evaluation
- It uses data and its analysis to move from what you believe a program is doing to computing its real impact.

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What data do we need for evaluate ROI?

- Size of target population
- Risk Stratification
- Enrollment rate
- Duration of program pilot
- Baseline costs
 - Existing services
 - New program services
- Data Types:
 - Health Utilization
 - Hosp., ED, Meds., procedures
 - Staff Labor
 - Cost of Education materials
 - Cost of Home Interventions

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Center for Health Care Strategies provides a web-based interactive ROI calculator

WELCOME TO THE ROI FORECASTING CALCULATOR

Many policymakers and health care payers recognize patient-centered health homes and medical homes as possible solutions to escalating health care costs, fragmented care delivery, and a badly strained primary care delivery system. These strategies can potentially enable more coordinated care, improve health outcomes, reduce avoidable and costly services like emergency department visits and hospital admissions, provide much-needed medical support to primary care practices, and ultimately transform primary care delivery. These initiatives vary in design, but generally play and support health care teams to provide:

- Care management and care coordination;
- Health promotion;
- Transitional care from inpatient and other settings;
- Patient and family support; and
- Referrals to community and social support services.

Policymakers and health care payers across the country are exploring options to invest in these new care models to bend the cost trend. Indeed, health care reform presents an opportunity for Medicaid programs to reimburse for these services for patients with chronic conditions and complex medical and/or behavioral health care needs.

To help stakeholders assess and demonstrate a return on investment (ROI) from health homes and medical homes, the Center for Health Care Strategies (CHCS) developed the ROI Calculator for Health Homes and Medical Homes.

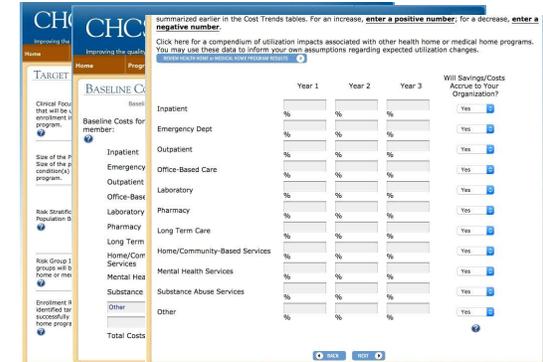
To complete an ROI forecast, you will need to input the following information:

- Timeframe for forecast period and ramp-up
- Size of target population
- Risk stratification (optional)
- Expected enrollment rate
- Average annual baseline costs for target population, by service category
- Trend (expected growth in health care costs)
- Anticipated changes in utilization patterns
- Estimated program costs
- Discount rate

Note: Outcomes are provided within the Calculator to assist you in developing a forecast. For additional tips and best practices, a User's Guide is also available. The Calculator will automatically save your work when you click on the "Save" button at the bottom of each page.

For more information about CHCS, please visit our primary website at www.chcs.org.

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summarized earlier in the Cost Trends tables. For an increase, enter a positive number; for a decrease, enter a negative number.

Click here for a compendium of utilization impacts associated with other health home or medical home programs. You may use these data to inform your own assumptions regarding expected utilization changes.

	Year 1	Year 2	Year 3	Will Savings/Costs Accrue to Your Organization?
Inpatient	%	%	%	Yes
Emergency Dept	%	%	%	Yes
Outpatient	%	%	%	Yes
Office-Based Care	%	%	%	Yes
Laboratory	%	%	%	Yes
Pharmacy	%	%	%	Yes
Long Term Care	%	%	%	Yes
Home/Community-Based Services	%	%	%	Yes
Mental Health Services	%	%	%	Yes
Substance Abuse Services	%	%	%	Yes
Other	%	%	%	Yes
Total Costs				

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ANALYSIS SUMMARY
 ROI Analysis and Sensitivity Analysis | Per Member Costs & Savings | Per Member Per Month Details | Summary

Forecast Name: Asthma Care Program

Total Membership in Population Base	3,000
Clinical Focus	Asthma
Target Strata	High Risk, Medium Risk
Outreach Goal	50%
Ramp-up Period	6 months
Total Target Population Members	900
Total Enrollees	450

	Year 1	Year 2	Year 3
Inpatient	-60%	-50%	-30%
Emergency Dept	-50%	-50%	-40%
Outpatient	20%	20%	20%
Office-Based Care	20%	20%	20%
Laboratory	10%	10%	10%
Pharmacy	10%	10%	10%
Long Term Care	0%	0%	0%
Home/Community-Based Services	40%	40%	40%
Mental Health Services	0%	0%	0%
Substance Abuse Services	0%	0%	0%
Other	0%	0%	0%

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Asthma Tier II Interventions
 HEPA vacuum
 Non-scented bleach
 Non-scented cleaning Furnace filters
 Smoking cessation kit
 Mattress/pillow covers

Asthma Tier II Interventions
 Beds and/or pillows
 Carpet removal
 Air conditioning unit
 Floor replacement
 HEPA air filter unit
 Bathroom vent installation
 HVAC duct cleaning

Mich. Dept. of Community Health

Cost Benefit (3 years)
 Total Program Cost: \$1,299,207
 Net Benefits: \$2,524,193

OVE WILL. Case Studies: The Benefits of Home Visits for Children with Asthma- National Center for Healthy Housing, Report, 2014 Children's Mercy

Detailed summaries of programs and reported ROIs are available

Clinical Commentary Review
Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions

Joy Hsu, MD, MS*, Nicole Whitlin, BA*, Lilliana Lewis, MD, MPH*, and Elizabeth Herman, MD, MPH* *Allergy, Clin Exp Immunol*

FIGURE E1. Geographic Distribution of intensive Outpatient Asthma Self-Management Education (AS-ME) and Asthma-Related Home Visit Programs in the United States.

Hsu, et al., Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions, 2016, *J Allergy and Clinical Immunology in Practice* 4 (6), 1123-1134. Children's Mercy

Many asthma care programs included home visits and showed significant return on investment (ROI)

- 42 programs identified, 9 outpatient ASME programs and 17 home-based intervention programs reported return on investment (ROI) data
- Most programs were associated with a positive ROI
- A few programs observed positive ROIs only among selected populations (e.g., higher health care utilization).
- Interpretation limited by heterogeneous ROI calculations

Hsu, et al., Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions, 2016, *J Allergy and Clinical Immunology in Practice* 4 (6), 1123-1134. Children's Mercy

TABLE 1. US programs with ROI data for intensive outpatient ASME, by state*

State	Intervention	Health care utilization	Study	Study design
Illinois	AS-ME: 3 group sessions (6-10 sessions each); Education on asthma triggers and inhaler technique; Relaxation exercises; nurse; \$89/person	ED visits by 59%	ROI: \$22.50 per \$1 Time to realize ROI: 1 y	RCT
Michigan	AS-ME: 3 group sessions (6-10 sessions each); Education on asthma triggers and inhaler technique; Relaxation exercises; nurse; \$89/person	ED visits by 57%	ROI: \$6.49 per \$1 Time to realize ROI: ~3 y	RCT
Ohio	AS-ME: 3 group sessions (6-10 sessions each); Education on asthma triggers and inhaler technique; Relaxation exercises; nurse; \$89/person	ED visits by 64%	ROI: \$43.64 per \$1 Time to realize ROI: 2 y	Pre-post
North Carolina	AS-ME: 6 group sessions for families (10-15 families each) in clinic; health education; \$1,558 per family	ED visits by 58%	ROI: \$7.79-\$13.29 per \$1 Time to realize ROI: 2 y	Pre-post
North Carolina	AS-ME: 8 group sessions; Education on communication strategies with clinicians, inhaler use, and trigger reduction; Supplies (asthma journal, peak flow meter, relaxation tape); NR, ~\$450 per participant	ED visits by 59%	ROI: \$2.54 per \$1 Time to realize ROI: 3 y	Pre-post
Ohio	AS-ME: 7 group sessions; Asthma diary; Education on peak flow meter use; NR; \$208 per participant	ED visits by 59%	ROI: \$2.28 per \$1 Time to realize ROI: 2 y	Pre-post
Ohio	AS-ME: 2 group sessions for caregivers and 2 group sessions for children; Linkage to community resources; Review of inhaler technique; Supplies (holding encasements); Physicians received spacer, peak flow meter, EPR-3, and blank AAP for each child; social worker ± exterminator; average \$337 per child.	ED visits by 59%	ROI: <\$1 per \$1 ROI (if >1 hospitalization or ≥2 unscheduled visits in the past 2 mo): >\$1 per \$1 Time to realize ROI: 2 y	RCT

Hsu, et al., Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions, 2016, *J Allergy and Clinical Immunology in Practice* 4 (6), 1123-1134. Children's Mercy

TABLE 1. (Continued)

Intervention(s); Personnel; Program cost	Health care utilization outcome	Economic outcome	Study design
AS-ME: 6 group sessions for families (10-15 families each) in clinic; health education; \$1,558 per family	ED visits by 58%	ROI: \$0.62 per \$1 ROI (if ≥1 hospitalization in the past year): \$11.22 per \$1 Time to realize ROI: 2 y	RCT
AS-ME: 8 group sessions; Education on communication strategies with clinicians, inhaler use, and trigger reduction; Supplies (asthma journal, peak flow meter, relaxation tape); NR, ~\$450 per participant	ED visits by 59%	ROI: \$2.54 per \$1 Time to realize ROI: 3 y	Pre-post
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Hsu, et al., Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions, 2016, *J Allergy and Clinical Immunology in Practice* 4 (6), 1123-1134. Children's Mercy

Children's Mercy Program 2001 - 2010

Clinical Commentary Review

Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions

Joy Hsu, MD, MS¹, Heidi White, BA¹
Boston, Mass

Study	Program (Interv.)	Reference	Participants (N): Health insurance source	Health care utilization outcome	Economic outcome	Study design	Study design
1	Kansas City Children's Asthma Management Program (2001-2009)	Journal of Allergy and Clinical Immunology 2010;125:1083-1092	Children with asthma and frequent health care utilization (3.78); Medicaid/MCO	ED visits by 44% hospitalizations by 64%	Net savings of \$1.57 PMPM (difference between \$0.43 PMPM program cost and gross savings of \$2 PMPM)	Pre-post	Pre-post

Hsu, et al., Economic Evidence for US Asthma Self-Management Education and Home-Based Interventions, 2016, J Allergy and Clinical Immunology in Practice 4 (6), 1123-1134.

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Research reviews indicate home interventions for prevention and control of allergic and respiratory diseases have had positive impacts

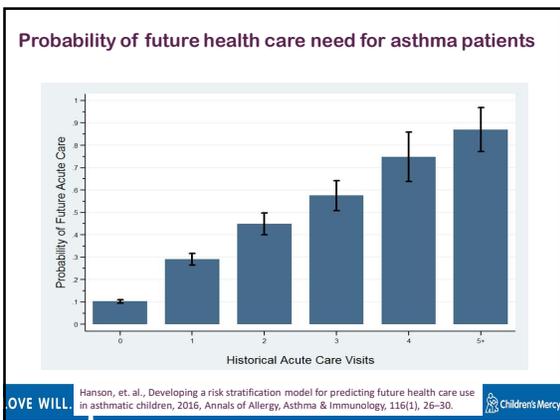
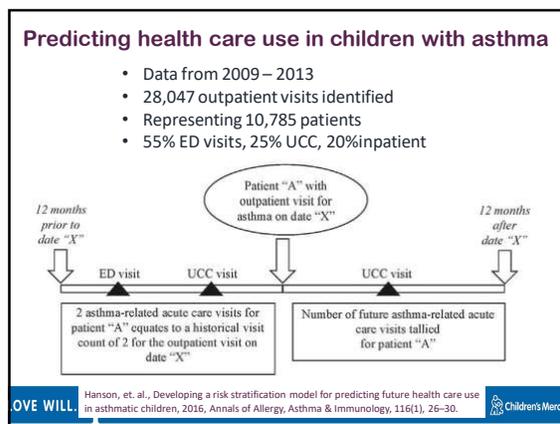
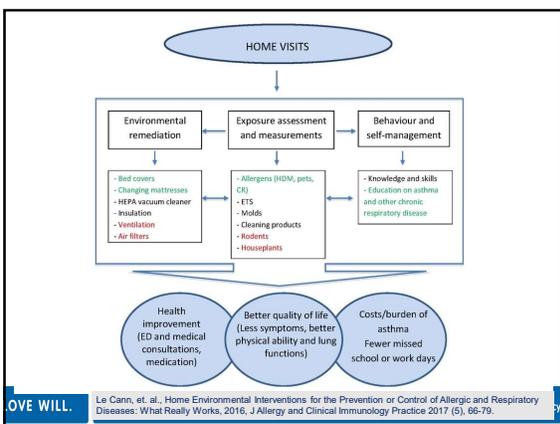
Clinical Commentary Review

Home Environmental Interventions for the Prevention or Control of Allergic and Respiratory Diseases: What Really Works

- 26 studies carefully evaluated for intervention protocol, behavior change, environmental impact and health outcomes
- Most programs focused on allergens and molds with few investigating home chemical pollutants
- In general, home interventions proved effective in reducing exposure to allergens and molds

Le Cann, et al., Home Environmental Interventions for the Prevention or Control of Allergic and Respiratory Diseases: What Really Works, 2016, J Allergy and Clinical Immunology Practice 2017 (5), 66-79.

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In 2016, est. High Risk Asthma Protocol (HRAP):

Provide consistency of care in the screening and evaluation of patients with asthma who are classified as high risk, and ensuring they receive coordinated care involving comprehensive resources associated with improved outcomes.

Elements	Outpatient Elements
• Education	• Education
• Inpatient consults offered	• Spirometry
• Guidelines based asthma action plan	• Exhaled nitric oxide
• Environmental Health Referral	• Asthma Control Test (ACT)
• Social work	• Allergy Testing
• Screen for complications of steroid use	• Environmental Assessment
• Contact PCP	• Social work
	• Depression and adherence screening
	• Case management

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All cases are managed through a case management system

- Survey and management tool
- HIPAA secure system with outside logging capabilities
- Manage step by step “touches” with family
- Built reports
- Run queries for stats

Log In **REDCap**
Children's Mercy
 APP Database
 Add new Asthma Priority Program (642)
 Enter Name:
 Select Family Program:
 Risk Stratification:
 CHS Start working with Family:
 What type of insurance does Family have? 1. POK 2. Other
 Child's first name:
 Child's last name:
 Child's Date of Birth:
 Child's Age:
 Parent's first name:
 Parent's last name:

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Stratify service for efficiency

- Divide home assessment services into levels based Total Asthma Risk
 - ~75% are lower risk patients needing basic assessment services
 - Visual assessment & in-home education
 - Assessment reporting with issues & actions
 - Follow-up & case management
 - ~25% of higher risk patients needing advanced assessment services
 - Basic services, plus
 - Deeper environmental investigation
 - Environmental measurement and sampling

Kennedy, et al., The Role of Home Environments in Allergic Disease, Clinical Reviews in Allergy and Immunology, 2019

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Assessing a home means evaluating the entire building for environmental issues

Site & Building Assessment

Mechanical & Appliance Assessment

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Room by Room Assessment

Domains of Qualitative Assessment:
 Keep It:

- Dry
- Clean
- Safe
- Well-Ventilated
- Pest-Free
- Contaminant-Free
- Well-Maintained
- Thermally controlled

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Home Assessments by Community Health Workers following 4 touch/ 2 home visit model

Asthma Home Assessment Checklist
 Touch 1- First Phone Call
 Asthma Home Assessment Checklist
 Visit 2, Home Visit 1
 Asthma Home Assessment Checklist
 Visit 3, Home Visit 2 (Report Delivery)
 Asthma Home Assessment Checklist
 Visit 4, Follow-up Phone Visit Two

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Some assessments include measurement and sample testing

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Assessment Report includes a healthy home action plan for family-

- Connects home assessment to education and interventions
- Identifies what our HH program will do and what the family is asked to do
- Prioritizes interventions based on hazard risk



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We use a multi-faceted, multi-targeted process

Healthy Home Assessments Healthy Home Supplies Healthy Home Interventions



Healthy Home Actions

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Simple home-based interventions improve health

Overall health improvements for asthmatic children were significant ($p < 0.05$) along with improved indoor environmental quality when heating, ventilation, and air conditioning (HVAC) servicing, dehumidification, and enhanced filtration (MERV 12) were used.

*Johnson L, Ciaccio C, Barnes C, Kennedy K, Forrest E, Pacheco F, Dowling, P and Portnoy J. Low cost interventions improve indoor air quality and children's health. Allergy Asthma Proc. 2009 Jul-Aug; 30(4):377-85

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CMH Asthma Friendly Home Program (AFHP) common interventions performed:

High Intensity Home Interventions (% of homes work performed)

- Furnace cleaning and maintenance - 93%
- Furnace repair - 64%
- Carpet removal/replacement - 23%,
- Carpet cleaning - 20%
- Bath exhaust ventilation - 23%
- Dryer exhaust ventilation - 21%
- Minor gutter repair – 20%
- Repair kitchen drain – 14%
- GFCI outlets installed near water sources- 47%
- Kitchen fire extinguisher – 71%
- Carbon monoxide alarms installed - 76%

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Communicate with Primary Provider in EMR

Report Findings Recommendations

Exterior

(Location / Issues / Recommendations)

Exposed wires under back deck

1) A licensed electrician should make the necessary repairs to the electrical wires to prevent electrical shock hazards and code issues in the future.

Downspout damaged on back side of home - no splash blocks or plastic drain tile

1) Repair existing downspout or replace with a new one to allow water to be diverted away from the home properly.

Air Flow & Ventilation

(Location / Issues / Recommendations)

Furnace not lighting properly - yellow flame and family provided hazardous condition form at time of assessment (the family was suppose to receive a new furnace due to these issues and high carbon monoxide levels detected in the home from a third party)

1) A licensed professional in heating and cooling should assess the furnace and make the necessary repairs to prevent health and safety concerns.

2) Replace existing fiberglass filter with a good pleated filter that has a Minimum Efficiency Rating Value (MERV) of at least 8 that will help capture small particles and allergens. Change filter as soon as possible. www.pleat-edcap.org

Exterior
 Air Flow & Ventilation
 Allergens & Dust
 Moisture Control
 Chemical Exposure
 Safety & Injury Prevention
 Landlord Section

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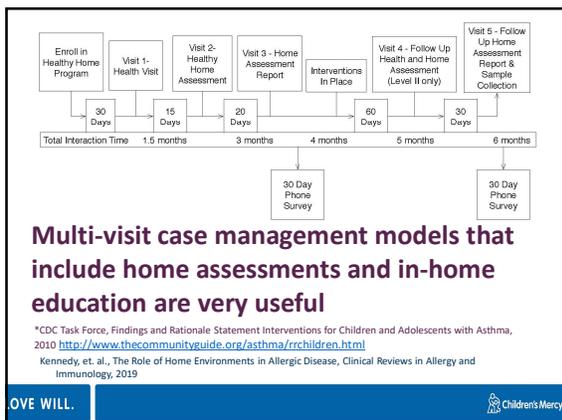
CMH- Asthma Friendly Home Program

>1200 Families received home visits including:

- Healthy home education
- Visual environmental assessment
- Indoor environmental assessment (Advanced)
 - Air flow and ventilation assessment
 - IAQ gas measurement
 - Dust particle and allergen assessment
 - Moisture and mold assessment
- Home maintenance and product surveys
- Home safety check up - and a Healthy Home Resource Manual

(Williams D 2010, KCCAMP, RWJ 2007, CHCS 2006, Miller et al. 2003)

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We use a multi-faceted, multi-targeted process

Healthy Home Assessments Healthy Home Supplies Healthy Home Interventions

Before

After

Healthy Home Actions

Just because you've provided education about effective environmental interventions doesn't mean anything is done

Likelihood that patients will perform various interventions:
Low=<33% Medium = 34-66% High =>66%

	Likely adherence (Schutz)	Likely adherence (Le Camm)
Facilitative factors		
IPM	Medium	Medium
Fix leaks, intrusion, moldy materials	Medium	Low
Ventilation, dehumidification, insulation	High	High
Source control		
Chemical	Low	
Mechanical	Low	
Pet avoidance/washing	Low	Medium
Reservoir		
Vacuuming	Medium	High
Wash bedding	High	High
Remove carpet/furniture	Low	Medium
Change mattress	Medium	
Pathways		
HEPA air filtration	Low	Medium
Encasements	High	High

Kader, Kennedy, Portnoy, Indoor Environmental Interventions and their Effect on Asthma Outcomes, Current Allergy and Asthma Reports (2018) 18: 17

Lots of resources on programs and data here:

National Center for HEALTHY HOUSING

Case Studies: The Benefits of Home Visits for Children with Asthma

<http://www.nchh.org/Resources/HealthcareFinancing/CaseStudiesandResources.aspx>

Asthma Management isn't just ROI – It's about –

- Managing complex co-morbidities
- Asthma disparities in communities
- Mission to improve community health

It's about Jeremy

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Environmental Health Program

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