

## ▶ GUEST COMMENTARY

# Breathe Easy at Home: A Web-Based Referral System Linking Clinical Sites With Housing Code Enforcement for Patients With Asthma

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**Abstract** Asthma, the most significant cause of pediatric morbidity and mortality, is exacerbated by adverse environmental conditions, especially substandard housing. The clinical care provider is often unable to address housing and environmental trigger issues. In Boston, Massachusetts, a web-based referral system called Breathe Easy At Home has been put in place, through which clinicians can refer patients to have their homes inspected for housing code violations that may be contributing to their asthma. Violations will then be brought to the attention of the landlord, who then has the option of redressing the issue or be taken to housing court. By bringing the local public health department, the city's inspectional services department, and the clinical care provider together with the help of a program coordinator, Breathe Easy At Home is able to provide comprehensive care to asthma patients. This program also serves as a replicable model for other cities and jurisdictions to follow.

## Introduction

Asthma, the most significant cause of pediatric morbidity and mortality, is a chronic respiratory disease exacerbated by environmental triggers including rodents, cockroaches, and mold. Many of these environmental triggers may be regulated through state sanitary codes for housing. Boston, Massachusetts, has designed a centralized web-based system that allows doctors or nurses to make referrals for city housing code inspections and to then receive e-mail updates on the status of the case. This system, Breathe Easy at Home,

received a 2008 Model Practice award from the National Association of County and City Health Officials. This article provides a blueprint for city, county, or state health departments who seek to adopt the Breathe Easy at Home approach.

## Background

### Population Demographics

Boston is a diverse city with 617,594 residents, nearly 20% of whom live in poverty. Over half of the Boston population is non-

Caucasian; 22% of the population is African-American, 17% of the population is Latino, and 9% of the population is of Asian/Pacific Islander descent (U.S. Census Bureau, 2010). Boston's 16 distinct neighborhoods include some of the oldest housing stock in the U.S., including public housing.

Among both Boston high school students and adults, 11% report having doctor-diagnosed asthma (Boston Public Health Commission [BPHC], 2011). In 2007, the asthma hospitalization rate for African-American children under the age of five was 3.5 times the rate for Caucasian children (BPHC, 2009). Almost 2.5 times as many adult Boston residents living in nonpublic rental assisted housing reported doctor-diagnosed asthma, as compared to residents living in market-rate housing (BPHC, 2010).

### Asthma Exacerbations

In the U.S., people spend much of their time indoors; children in particular spend as much as 80%–90% of their time at home, in school, and in other indoor environments (U.S. Environmental Protection Agency, 2002). Several biological and chemical agents in the indoor environment, including bleach, pesticides, and other common household cleaning solutions are linked to asthma exacerbation. Conditions that contribute to asthma exacerbation include rodent and cockroach infestations as well

FIGURE 1

**Breathe Easy at Home Case Referral**



as chronic dampness, which contributes to mold and mildew growth. All of the above are covered by the Massachusetts state sanitary code for all housing. Exposure to cockroach allergen in sensitized individuals can cause asthma exacerbation (Institute of Medicine [IOM], 2000) and exposure to mold among sensitized individuals is associated with asthma exacerbation (IOM, 2004). Children with asthma, sensitized and exposed to mouse allergen, also have higher rates of hospitalization (Pongracic, Visness, Gruchalla, Evans, & Mitchell, 2008).

Baseline environmental assessments revealed that nearly 80% of children sensitive to cockroach antigen and nearly 90% of children sensitive to dust mites had evidence of these allergens in their bedrooms. Increasing evidence demonstrates that reducing residential exposures to these factors can improve the health of people with asthma (Krieger, 2010). Thus, the home environment has been identified as a key site for primary or secondary prevention interventions. The Inner-City Asthma Study

(ICAS) enrolled 937 children with moderate and severe asthma from seven major U.S. cities in a randomized controlled study of an in-home environmental intervention. The intervention protocol included home environmental assessments, education for families, and provision of supplies and services tailored to the child's skin-test-sensitization profile. Reductions in levels of cockroach and dust mite antigens in bedroom floors correlated with decreases in symptom days, hospitalizations, and unscheduled health care visits (Morgan et al., 2004).

A recent review of in-home environmental intervention studies concluded that multifaceted tailored asthma intervention protocols, like the one in ICAS, are effective at controlling asthma symptoms (National Center for Healthy Housing, 2009). The latest National Asthma Education Prevention Program guidelines urge health care providers to address control of environmental asthma triggers as a key component of asthma care (National Institutes of Health, 2007).

**Process**

Almost 10 years ago, the city of Boston's Inspectional Services Department (ISD), which enforces the state sanitary code for all housing in the city of Boston, initiated the Breathe Easy at Home (BEAH) initiative. In the early stages of the program, clinicians caring for patients with asthma submitted housing inspection requests by telephone. A message would often be left and may or may not have been returned. If the inspection was done, referring clinicians did not receive information on the findings and status of the case. Clinicians frequently complained that neither they nor their patients knew the results of their inspection.

In 2006, the involvement of a clinical partner led to the design of a web-based system that reflects the needs of busy medical practices and encourages clinicians to address environmental asthma triggers with their patients. Clinicians simply log on to the web-based system to refer a family for a housing inspection. They then receive regular online updates on the status of the referral and violations (Figure 1).

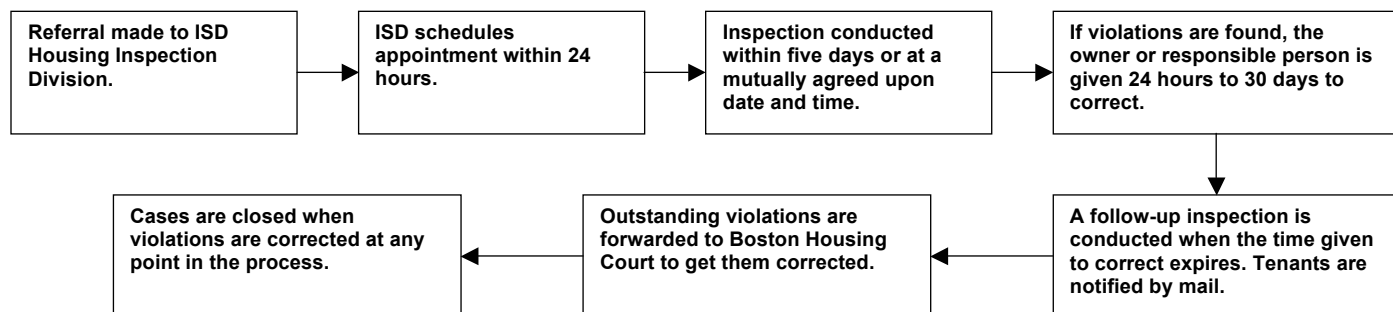
BEAH is a collaborative effort of the ISD and Boston Public Health Commission, the health department for the city of Boston, and Boston Medical Center, the city hospital serving vulnerable and low-income residents. The web-based system was launched with a part-time coordinator, funded with support from the U.S. Environmental Protection Agency. In 2007, city funding made it possible to hire a full-time coordinator. Other BEAH partners include Children's Hospital Boston; the Boston Urban Asthma Coalition; Boston Housing Authority, which provides or administers housing for 10% of Boston's residents; and the Medical-Legal Partnership, which fosters interdisciplinary collaborations to advocate for patients and help ensure that their basic needs (such as health insurance and housing) are met.

Awareness of the BEAH program is promoted through health center and hospital meetings as well as a newsletter to keep clinicians informed of program updates and patient resources. Since BEAH inspections are conducted by staff in the housing inspection division of ISD as part of their sanitary code enforcement responsibilities, they require no additional inspection staff.

The Massachusetts "Housing Code" is officially titled *State Sanitary Code Chapter*

FIGURE 2

**Breathe Easy at Home Process**



ISD = Inspectional Services Department.

*II: Minimum Standards of Fitness for Human Habitation.* Housing code inspectors conduct a visual inspection using a standardized form, usually in response to resident complaints. Inspections may result in the issuance of a notice of violation, specified in a “correction order” along with a maximum stipulated time within which to correct the violation. A case is closed when the violation is corrected. If the violation is not corrected, the case may be forwarded to housing court (Figure 2).

**Outcomes**

Following the pilot, which involved 16 referrals, 1,169 referrals have been made to BEAH (Figure 3) with continual increases in numbers. Rodent infestation is consistently the most frequent housing code violation cited for BEAH cases, followed by cockroach infestation. More than one violation may be present in a home. To date, 70% of BEAH cases have been resolved without going to housing court.

Boston’s largest landlord, the Boston Housing Authority, has agreed to respond to violations uncovered via BEAH within 24 hours. Boston Housing Authority data show a decrease in pest work orders after the implementation of new pest control policies and a public awareness and resident education campaign on safe and effective pest control strategies. This decrease in work orders is consistent with BEAH program data showing reductions in Boston Housing Authority pest-related violations during the same time period.

The neighborhoods of Roxbury and Dorchester are among those with the highest asthma hospitalization rates in Boston for children under five years of age (BPHC, 2009), and are the neighborhoods with the highest number of BEAH referrals. The BEAH program will continue to monitor health outcome data and referral patterns to ensure that the program is serving Boston’s neighborhoods most impacted by asthma.

**Discussion**

An online survey to solicit feedback from referring clinicians on Web site functionality and program results has led to program improvements. A survey is now underway to gather patient feedback on the program and to monitor improvements in health and environment. A survey of inspectors provided invaluable insight about patients’ difficulties with housekeeping and understanding the BEAH process. In response, the program developed educational materials on safe cleaning products and on the BEAH process. Inspector feedback has also led to the creation of materials for property owners and managers to help them better understand the link between addressing violations and improving the health of residents with asthma.

Improvements to the BEAH Web site are ongoing. Modifications to the Web site are intended to minimize narrative and to increase standardization via pull-down menus and check boxes. Data from BEAH can be used to develop prevention initiatives, as

has happened at Boston Housing Authority. Data are monitored to identify health institutions that are either not registered for or not actively participating in the BEAH network and compared with other data to geographically prioritize outreach efforts.

This web-based tool brings city resources to the busy clinical setting, allowing physicians and nurses to make referral inspections while their patients are in the clinic. Another advantage of this system is it makes a physician or nurse the complainant, not the tenant. This is one of the program designs to reduce tenant-landlord tensions around these housing code issues. Although this is most helpful for those clients who are renters and need intervention in dealing with landlords, the program can be helpful even for nonrenters who need assistance in identifying environmental triggers in and around their homes.

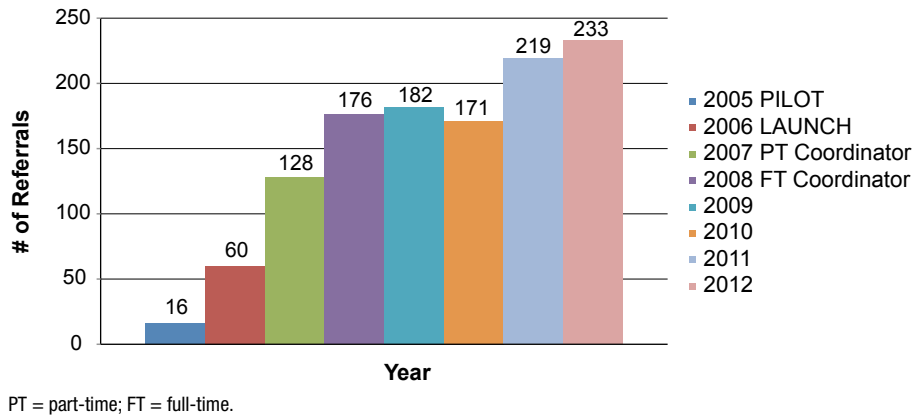
Inspector buy-in is critical to program success. Training the inspectors to understand the health significance of their work, listening to their feedback, and allowing them the opportunity to interact with the health care system directly (e.g., by having medical residents shadow them on inspections) are all strategies that have helped propel the BEAH program forward.

**Conclusion**

The BEAH program is particularly remarkable in its adaptability and replicability. Key elements of the program are trained inspectors who conduct environmental assessments and

FIGURE 3

**Breathe Easy at Home Referrals, 2005–2012**



communicate the findings to medical partners. When necessary, the inspectors have the capacity to enforce resolution of issues that are found. The program builds upon existing city capability by providing asthma training to city housing inspection staff, improving two-way communication between inspection staff and clinical care providers, and employing a program coordinator to oversee this communication. BEAH applies existing sanitary codes for housing using existing staff and

is a powerful, low-cost resource in the effort to improve health and quality of life for children and adults with asthma. Although no national health code for housing exists, state and local agencies—mostly in the northeastern part of the U.S.—have adopted health or sanitation codes to respond to housing issues. In those communities that do not have such codes, any system for assessment and report of environmental conditions will serve the purposes of a similar program. 🐹

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