Introducing Health@Home

High-Performance Housing Rehabilitation Guidelines

June 18, 2020
Connection Issues and Chats

Should you have any **technical** issues or concerns:
1. Use the Chat Box on the bottom right (or) make sure the "Chat" icon is lit blue on the top
2. Submit your message to "Host and Presenters" so that all of us can see it.

For **Questions** related to the content:
1. Use the Q&A Panel (same area as the chat box)
2. Submit to all as panel members and the host.
Agenda

1. Welcome and Logistics – Lael Holton, AECOM
3. Health@Home Overview -- Ellen Tohn, Tohn Environmental Strategies
4. Keep it Well Ventilated – Nate Price, Indoor Climate Research & Training group, University of Illinois
5. Keep it Clean – Ellen Tohn, Tohn Environmental Strategies
6. Healthy Homes Rehab Case Study - Jill Breysse, National Center for Healthy Housing
7. Questions
Presenters

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Poll Question #1

What’s your role in the healthy housing or rehabilitation space?

• Rehab program manager
• Rehab specialist
• Supplier or Contractor
• Housing Developer
• Local government
• Non-profit organization
• Building Manager
• Lead Hazard Control
• Weatherization
• Other
Welcome

• Welcome to the Health@Home Journey
• This is a four-part series: we hope you will stick with all four sessions!
• Importance of healthy housing never been clearer:
  • Building more efficient homes, including passive house, with ACH down to almost zero - close to net zero energy.
  • Spending more time in our homes than ever due to Covid-19.
  • Asthma and respiratory ailments identified as risk factor
• We need to be sure that when we rehab our homes, we maximize the indoor experience, minimize hazards.
Health@Home in Context

• Health@Home focuses on moderate rehabilitation, home remodeling, or home repair programs.
• Steps you can take to address healthy housing through those programs.
• While broadly applicable, focus is on SF and low-rise MF.
• For new, substantial or gut rehab consider a green building standard with STRONG healthy housing criteria:
  • Enterprise Green Communities
  • LEED
  • National Green Building Standard
  • Earthcraft, Earth Advantage
  • Energy Star Indoor Airplus
  • WELL, Fitwell, HH Rewards, Others
• For in-depth discussion, see EPA IAQ Protocols for Existing Buildings
Green Housing – BRIGHT Study

Conventional

New HP
Housing interventions

Old Colony (South Boston)

New

Conventional
Environmental Exposures

- Inadequate ventilation: 89% (Conventional), 27% (Green)
- Chemical exposure: 65% (Conventional), 61% (Green)
- Mold: 31% (Conventional), 4% (Green)
- Secondhand smoke: 31% (Conventional), 19% (Green)
- Pests: 58% (Conventional), 20% (Green)
- Combustion byproducts: 82% (Conventional), 0% (Green)
Results: Asthma Morbidity

Odds ratios (OR) for control children experiencing:

- Asthma symptoms: 2.9 (1.0, 8.3)
- Asthma attack: 3.2 (1.1, 9.1)
- Hospital visit: 4.2 (1.1, 16.6)
- Missed school for asthma: 4.8 (1.4, 16.6)
Technical Assistance Available

• Encourage you to consider incorporating H@H guidelines in your current rehab standards – pick your spots!
• HUD offering a limited amount of “on-call” TA to help review/strengthen your current rehab standards
• If interested contact energyaction@hud.gov; we will send you a TA application form.
Why Health@Home?

- Home conditions can contribute to health issues, including injuries, asthma and respiratory ailments, radon-induced lung cancer, and lead poisoning.
- Rehab projects are an opportunity to address housing-based health issues.
- Increased attention to indoor environment due to COVID-19.
- Health@Home on HUD Exchange: [https://www.hudexchange.info/resources/health-at-home/introduction/](https://www.hudexchange.info/resources/health-at-home/introduction/)
Home Conditions Impact Health

A few examples

- **Asthma**: 8% adults and children have asthma AND 20-40% of asthma attacks can be linked to home conditions
- **Radon**: 21,000 annual deaths estimated, over 7 million homes with suspected risks
- **Falls**: 1 in 4 older adults fall each year, over 50% of falls occur in the home.
# Health@Home Webinar Series

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
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<tr>
<td>Overview and Keep it Well Ventilated and Clean</td>
<td>June 18</td>
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<tr>
<td>Keep it Contaminant Free and Pest Free</td>
<td>July 23</td>
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<td>Keep it Dry and Safe</td>
<td>September 10</td>
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<tr>
<td>The Energy + Health Equation, Maintenance and Active Design</td>
<td>October 8</td>
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*All webinars will be from 3- 4pm EST, 12- 1 pm PST*
Target Users

Program Managers & Staff: Define local Healthy Housing Program Standard

Case Managers/Intake Staff/Underwriters: Customize local Healthy Housing Program Standard in conjunction with Participating Jurisdiction and subrecipient staff

Construction/Rehabilitation Specialists: Assist in the implementation of local Healthy Housing Standard, determine appropriate treatments to homes, and communicate guidelines to clients.
Guidelines Provide Practical Advice

Organized by nine healthy homes principles

- Rehab guidelines linked to each principle
- Designed to be easily incorporated into existing programs standards or specifications.

9 PRINCIPLES OF HEALTHY HOUSING

- PRY
- PEST FREE
- CLEAN
- WELL MAINTAINED
- SAFE
- THERMALLY CONTROLLED
- ACTIVE DESIGN
- CONTAMINANT FREE
- WELL VENTILATED
Focused on Relevant Building Components

Guidelines also presented by specific home systems

- Site
- Roof/Exterior
- Foundation
- Insulation & Sealing
- Interior

- Electrical
- Plumbing
- Heating & Cooling
- Ventilation
- Appliances
4 KEEP IT WELL VENTILATED

Pollutants can be found in concentrations 2 to 5 times higher indoors than outdoors. Increasing the supply of fresh air can help reduce exposure to indoor asthma triggers, allergens, and other contaminants. Ventilating local sources of moisture or contaminants from showers, combustion from fireplaces, or cooking appliances can also reduce indoor exposures that can increase respiratory and other health risks. Proper sealing of all exterior ventilation points is also essential to preventing the intrusion of exterior pollutants into the building environment.

4.1 BATHROOMS, KITCHENS, AND DRYERS

Ensure bathrooms, kitchens, and clothes dryers exhaust to the exterior and comply with ASHRAE 62.2 2016 requirements.

- Verify that all bathrooms and kitchens have point source exhaust ventilation ducted to the exterior (not to an attic or crawl space) with ductwork conforming to the manufacturer’s requirements.
- Vent clothes dryers to the exterior with ductwork that conforms to the manufacturer’s requirements and is free from obstructions and lint accumulation. Apply “Minimum Actions” in the “Source Ventilation” section of the EPA Healthy Indoor Environment Protocols for Home Energy Upgrades. See https://www.epa.gov/indoor-air-quality-iaq/healthy-indoor-environment-protocols-home-energy-upgrades.
- Consider installing exhaust fans in bathrooms with switching mechanisms that increase the likelihood of their use, such as switching the fan and light fixture with the same switch or using a humidistat to automate the operation of the fan relative to humidity level.

4.2 WHOLE HOUSE VENTILATION

To address significant reductions in air leakage (and subsequent reductions in ventilation) associated with substantial rehabilitation projects and projects with extensive air sealing and insulation work, install ventilation measures that meet ASHRAE Standard 62.2 2016 requirements for whole-building ventilation. Until recently, 62.2 applied only to single-family housing; however, 62.2 now covers all housing.

4.3 HVAC FILTRATION

Ensure that HVAC forced air systems have a leak-free filter housing on the return air ductwork, with a Minimum Efficiency Reporting Value (MERV) 8 filter, and that it is not clogged. Check that a MERV 8 filter is consistent with the manufacturer’s instruction.
Rehab Guidelines Highlight Impact

Indoor Air Quality

Safety & Falls

Other Contaminants

Operations & Maintenance
## Appliances

### 11.3 CLOTHES DRYER EXHAUST

<table>
<thead>
<tr>
<th>Repair Standard</th>
<th>Key Principles: Ventilated; Dry</th>
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<tr>
<td>All clothes dryers must be vented to the exterior with smooth metal ductwork and</td>
<td>Minimum Life: 5 years</td>
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<td>an outlet that seals against air and pest infiltration when the dryer is not</td>
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<td>operating, without the use of screening (e.g., using a positively sealing flap</td>
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<td>on the exterior).</td>
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### Replacement Standard

New dryer ductwork should be smooth metal, either galvanized steel or aluminum, with foil ductwork tape sealing the seams (not duct tape), and exhausted to the exterior with the shortest possible run. It should have an outlet that seals against air and pest infiltration when the dryer is not operating, without the use of screening (e.g., using a positively sealing flap on the exterior). Ductwork installation in unconditioned space should be insulated to a minimum R6.
Post-Rehab O&M Resources

- **Resident Handout**: Green and Healthy Building and Home Products
- **Supplemental Healthy Housing Resident Engagement Resources**: Web links organized by the 8 “Keep it” Principles
- **References**
Keeping a Home Well Ventilated

Nate Price
University of Illinois at Urbana Champaign
Benefits of Proper Ventilation

- Improved occupant comfort
  - Reduced odors
  - Balanced air distribution

- Reduced energy use
  - Increased air sealing opportunities
  - Improved HVAC performance

- Potential health benefits\(^1\)
  - Reduced concentration of contaminants (formaldehyde, CO\(_2\), VOCs, 1\(^{st}\) floor radon)
  - Reduced self-reported health issues (headaches, skin allergies, stress)

What is Proper Ventilation?

- Addresses multiple building components
- Requires that retrofits are installed correctly
  - Venting
  - Filters
- Must be evaluated for potential impact on the home
  - Appliance spillage
  - HVAC longevity
Dryers

- Potential hazards
  - Moisture
  - Fire hazard
  - Carbon Monoxide (gas dryers)

- Things to look for
  - Indoor diffusers
  - Clogged ducts/terminations
  - Broken dampers
HVAC Filtration

- Reduces airborne contaminants
  - Pollen, pet dander, dust
  - Fine particles\(^2\)
    - 6% reduction with MERV-6
    - 39% reduction with MERV-14

- Which filter to use?
  - Cost concerns
  - Increased maintenance
  - Increased wear on furnace motor
  - Manufacturer recommendations

HVAC Ducts

**Duct Sealing**
- Improves efficiency
- Prevents structural damage
- Can reduce exposure to contaminants

**Duct Cleaning?**
- Only when major problems occur
  - Pests
  - Mold/Water Damage
- Can increase exposure to contaminants\(^3\)

Bathroom Ventilation

Local Exhaust

- Installed in each full bathroom
  - Not required in ½ baths
- Minimum airflow of 50 CFM
- Sound rating of 3 sones or less
- Vented to the exterior
- Operated as needed

Whole House Exhaust

- Can be used in lieu of on-demand bath fan to satisfy ASHRAE requirements
- Airflow dependent on household
  - Number of residents
  - Building tightness
  - Existing deficits
- Sound rating of no more than 1 sone
- Vented to the exterior
- Continuously or intermittently operated

Local Exhaust Options

- Acceptable fans are made by most manufacturers
  - Often stocked by big box stores
  - Typically advertise “ASHRAE Compliant”
  - Verify flow and noise ratings
  - $125 to $200

- Controls
  - ON/OFF client controlled ($15)
  - Passive humidistat switch ($40 to $100)

Standard retail pricing not including venting materials, electrical, or labor
Whole House Exhaust Options

- Fewer manufacturers depending on what options you need
  - Must be rated for continuous use
  - May or may not include necessary controls
  - $150 to $300

- Controls
  - Intermittent switch ($50 to $90)
  - Continuous flow switch (Usually included)
    - Motion detector ($25-$50)

Standard retail pricing not including venting materials, electrical, or labor
Kitchen Ventilation

Requirements

- Must be installed in all kitchens
- Minimum airflow of 100 CFM
- Sound rating of no more than 3 sones
- Vented to the exterior

Installation Tips

- Range hoods that conform to standards will be more expensive ($100 and up)
- Proper venting may require additional consideration
  - Is it possible?
  - Additional expense
  - Client preference

Ventilation Ductwork

- Should be correctly sized to accommodate airflow
- Ducts should be as short as possible and avoid sharp turns
- Must be ran to an appropriate exterior termination
- Should be insulated outside conditioned space
Additional Options

Continuous Flow Range Hoods

Through Wall Fans

In-Line Exhaust Fans

HRV and ERV Systems

Balanced Ventilation Systems
Why? Cleanable surfaces make it easier for residents to reduce exposure to contaminants (including lead dust), allergens, pest droppings, pesticides, and eliminate pest harborage. For example, exposure to dust mites and pest droppings can increase asthma risks.

Appendix A provides guidance on cleaning practices, using green products.
Keep it Clean: Rehab Guidelines

Rehab:

- Use **durable and cleanable surfaces** in high use areas, e.g., floors, entry ways, countertops - e.g., [nalfa.com](http://nalfa.com) rating laminate flooring.
- Use products with **lower VOC emissions** e.g., [FloorScore](http://FloorScore).

**Job site cleaning:** Vacuum at the end of the work day, HEPA vacuums are preferred.

**O&M:** Keep countertops in good shape, cleanable. **More information on cleaning in future session.**
GREAT Case Study

HUD Health@Home Webinar: Keeping a Home Ventilated and Clean
June 18, 2020

Orness photo: Blumentals Architects
Older Adults Susceptible to Housing Conditions

- Spend 80% to 90% time indoors at home
- More likely to live in older homes:
  - Older heating/cooling systems
  - Damp, noisy, stuffy, dark
  - Built prior to ADA, Fair Housing, or visitability legislation
**PRE-RENOVATION**

- Hydronic heating system
- Individual through-wall ACs
- Exhaust-only ventilation strategy
- No mechanical fresh air ventilation
- Operable windows

**POST-RENOVATION**

- Geothermal heating & cooling
- Apt heat pumps
- Fresh air ducted to apartments
- Continuous bathroom exhaust
- Dryers vented to outside
- No smoking policy

Source: Blumental Architects

National Center for HEALTHY HOUSING
Fresh Air Ventilation
- 1-BR: 53 cfm (ASHRAE 20 cfm)
- 2-BR: 23 cfm (ASHRAE 45 cfm)

Bathroom Exhaust Testing
- 29 cfm (ASHRAE 25 cfm)

Energy Use
- 44% reduction in energy use
☐ Temperature
  Met summer & winter design criteria, consistent

☐ CO₂ levels
  Significantly improved

☐ Indoor air quality
  No significant change in TVOC, formaldehyde, most allergens
Housing Condition

- Kitchen fan use increased
- Bathroom fan use increased
- Water/dampness reports decreased
- Tobacco smoke inside home decreased
Health Outcomes

- Mental Health
  Significant improvement

- Physical Health
  Fewer falls
  Improved general physical health
Conclusions

- Greatly improved building and apartments
- Improved mental health and reduced falls
- Substantially less indoor smoking
Questions?

For any questions, please type them into the “Q&A” box in the lower right

We will answer as many as we have time to answer
A recording of this (and all future presentations) will be available on the Health@Home website: https://www.hudexchange.info/resources/health-at-home/introduction/

Next Session:
Keep it Contaminant and Pest Free – July 23, 3:00 – 4:00 PM ET

For questions or information contact:
Lael Holton
communitycompasstraining@aecom.com
Poll Question #2

What are the Healthy Housing issues that you are most concerned about? (Pick 3)

• Ventilation
• Pest control
• Mold and moisture
• Indoor Air Quality generally
• Lead
• Radon
• Contaminants
• Safety and falls
• Resident involvement and engagement
• Covid-19 related cleaning or education
Poll Question #3

What are the top two barriers to implementing HH measures? (Choose 2)

• Financing
• Good sources of Information
• Competing priorities
• Additional costs
• Lack of organizational support
• Missing technical knowledge