Keep it Clean

For a healthy home, not only is cleaning important but so is the consideration of surfaces and materials that are cleanable. Many surfaces are tough to clean, and corners and cubbyholes can be tough to clean, too. The goal is to keep a house clean AND CLEANABLE.

People are not born knowing that they must brush their teeth to prevent decay; they must learn it. So with household hazards, people need to learn how to clean and choose cleanable surfaces and materials.

Why Clean or Easily Cleanable?

- Reduced exposure to:
  - Chemical contaminants
  - Allergens
  - Pest droppings and urine
  - Pesticides and consumer chemicals
  - Heavy metals, such as lead and arsenic
- Reduced harborage for pests

Many of the contaminants above are persistent. They simply will not disappear unless they are cleaned. A house mouse, for example, will leave 3,000 drops of urine wherever it goes. Allergens can get into the home from a variety of sources. Therefore, cleaning is important and surfaces need to be cleanable.

The Pediatric Asthma and Allergy Clinic at the Boston Medical Center identifies the following environmental allergens that can be inhaled and tests for them with antigens.

Animals: Dog, Cat, Cockroach, Feather mix (chicken, duck, goose), Gerbil, Guinea pig, Hamster, Horse, Mouse, Parakeet, Rabbit, Rat

Dust Mites: D farinae, D pter., Dust mite mix, House Dust Mix

Molds: Alternaria, Aspergillus, Cladosporium, Epicoccum, Helminthosporium, Penicillium, Mold mix (AHAP)

Tree Pollen: Birch, Oak, Elm, Maple, Ash, Hickory, Tree mix

Grass Pollen: Grass mix (5-Grass Mix, Hollister-Stier)

Learning Objectives for this module

- List three contaminants or allergens that are frequently found in house dust and their health effects.
- Describe three ways allergens or contaminants get into house dust.
- Identify three strategies to reduce them.

Weed Pollen: Lamb's quarters, Marsh elder, Plantain, Ragweed, Sagebrush, Yellow dock

Other Allergens: Latex, Foods (aerosolized)

Other: non-inhalant allergens: Foods, Stinging Insects, Medications

Dust mites are particularly troublesome. Humid buildings may be colonized by dust mites—in dry climates, dust mites are limited to porous materials that get humidified.

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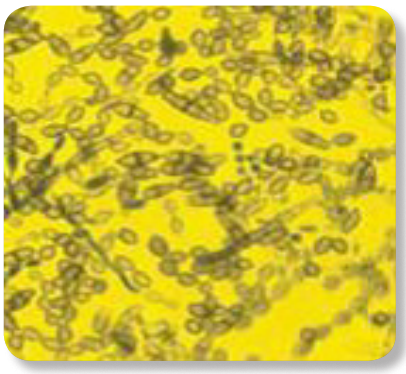
As the 2000 Institute of Medicine Report notes, dust mite allergen can cause asthma and trigger asthma attacks for those who are sensitized to this allergen.

Dust Mite Control

- Keeping humidity at or below 50%
- Washing bedding and blankets
- Using dust mite mattress and pillow encasements
- Freezing soft toys and small items
- If possible, replacing carpets with hard surfaces, and removing draperies and upholstery

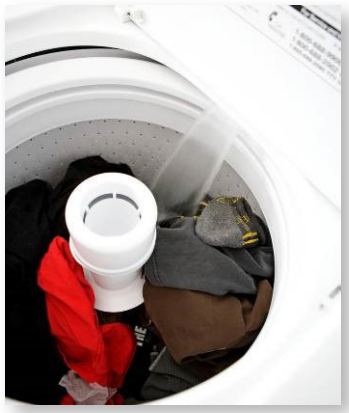
Washing in warm or even cold water will kill a significant percentage of mites and remove much of the allergen.[1]

About two-thirds of the dust in a low-rise building is tracked in from outdoors. The dust can become airborne from people's activities and, in fact, is found at higher levels nearer to people than in the general room air. Most house dust contains known contaminants in the form of heavy metals, pesticides, and fungal spores; therefore controlling dust is a good idea.



Environmental Allergens

- Animals
- Dust Mites
- Molds
- Tree Pollen
- Grass Pollen
- Weed Pollen
- Latex
- Foods
- Stinging Insects
- Medications



Track-off systems are crucial to controlling indoor dust. A good track-off system that is kept clean can collect upwards of 80% of the tracked-in dirt. A useful residential system consists of four parts:

- Hard-surfaced walkways
- A grate-like mat that allows grit to fall through
- A carpet portion to dry and collect fine particles
- An easily damp-mopped hard-surface floor

The photo to the right is an example of a fairly inexpensive track-off grate. However, keep in mind that the mesh must be fine enough to avoid trips in high heels.

Shoes off—less dust enters

Where does house dust come from?

- Brought-in
- Home grown
  - Lead Dust
  - Dust Mites
- Resident-Made
  - Garbage
  - Clutter

Brought-in Dust

Four Steps to Reduce

- Hard Surface Walkways
- Outside Grate-Like Mat
- Inside Carpet Pad
- Hard Surface Floor

How Do We Make Buildings More Cleanable?

- Install dust walk-off systems at entryways
- Keep activities that create dust away from people.
- Provide smooth, cleanable surfaces
- Provide effective storage space (to help avoid clutter)
- Choose flooring that is easy to clean
- Use vacuums that have good filtration and can be emptied quickly and thoroughly

Isolate Problems

Keep pets off beds and out of bedrooms

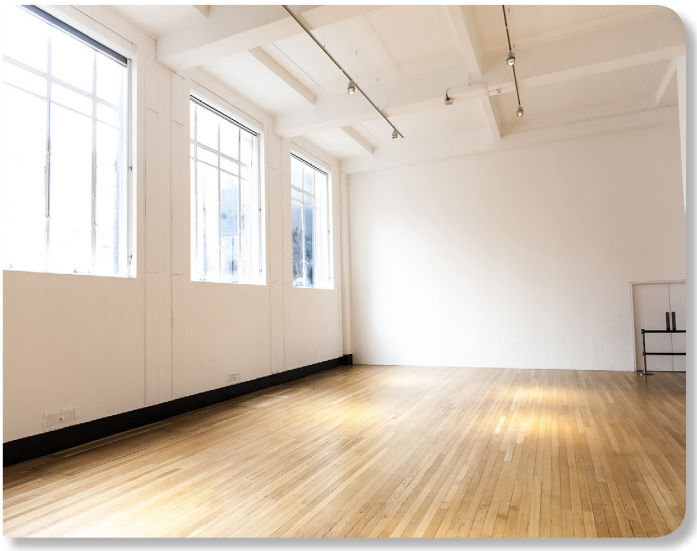
Pets sleeping in bedrooms and on beds can dramatically increase the occupant's exposure to pet dander and other contaminants and pathogens. This may be a special hardship to those with allergies and asthma. For these individuals, pets should be kept off the beds and out of the bedroom.

Beyond asthma, they also present potential risks of ticks and fleas to residents.

Cleanable Flooring

Hard-surface floors show dust more clearly, can be cleaned faster, and can be damp-mopped. Textile floor coverings are more complicated. They can collect and hold dust but often turn into "virtual sources" of airborne particles.

Vacuum cleaners are better than sweeping in terms of lessening the amount of particles they put in the air. This is increasingly the case as improved vacuum filters have become widely available. Vacuums with beater bars do a more thorough job of cleaning.



HEPA is an acronym for "high-efficiency particulate air." A HEPA filter can trap a large amount of very small particles that other vacuum cleaners would simply recirculate back into the air.

It is important to know whether you have vacuumed long enough. The vacuum in the picture at below-right has a sensor that turns from red to green when it has collected some fraction of the dirt.

Central vacuums can have the canister placed in garages or vented to the outdoors so that particles passing through the filters are not released into the house.

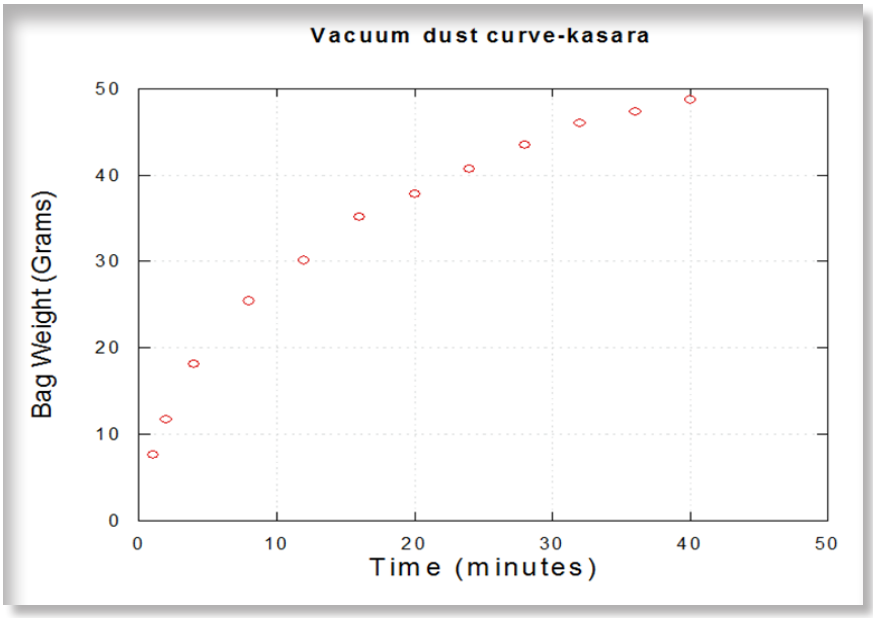
Older Carpets: Difficult to Clean

The graph below shows the weight gain in a vacuum cleaner bag every two minutes as it passes over the same square meter of carpet. The resulting curve is a classic saturation curve. When the bag stops gaining weight, all the recoverable dust has been removed from the carpet. The recoverable dust fraction is high for level loop and plush carpet and low for sculptured and shag carpet.

Notice that the vacuum recovered 50 grams of dust from one square meter of carpet and that it took over 40 minutes to do it. This is the result of not vacuuming quite long enough for an extended period. Once clean, it requires far less time to keep it clean. At this loading, the carpet is acting as a virtual source of airborne particles. When carpet is clean, it actually lowers airborne particle levels. It is not yet known at what point carpet changes from being a sink to a source.

What to look for in a vacuum?

- Beater bar
- Vacuum strength
- Filter type
- Dirt sensor



How Clean is Clean?

Determining if the house is clean is often difficult because there are very few standards for cleaning. However, there are standards for lead dust at 40 CFR Section 765. There are also standards for lead in soil. While not a standard, the federal government established goals to reduce allergens in its Healthy People 2020 program for mice and cockroaches.

- Clearance testing for lead
- 40 micrograms of lead per square foot on floors
- 250 micrograms of lead per square foot on window sills.
- Standards for allergens?
- Standards for dust?

Other Cleaning Methods

Problematic Cleaning Methods

- Carpet cleaning
- Overuse of antimicrobials
- Sanitizers
- Air fresheners

Duct Cleaning

EPA recommends duct cleaning when:

- There is substantial visible mold on hard surface ducts and other ventilation components.
- Ducts are infested with rodents or insects.
- Ducts are clogged with excessive dust and debris.
- Ducts actually release particles from supply registers.

See EPA's *Should You Have the Air Ducts in Your Home Cleaned?*[2]

Wire shelves are a better idea than particle board shelves. They are easier to clean.

Clutter

Clutter can be a problem because it can make it more difficult to keep a house clean and can also provide places for pests to hide. It can also be a source of trips and falls and, in more serious situations, hamper escape from the house if there is a fire or some other type of emergency. Clutter can also block ventilation vents. Typical solutions include using shelves and bins for organizing the home.

Hoarding is an excessive acquisition of possessions (and failure to discard them), even if the items are worthless, hazardous, or unsanitary. Compulsive hoarding may impair mobility and impede necessary access to or escape from the unit, creating a potential health and safety hazard. Hoarders may need assistance from mental health professionals.

If you are an assessor, and your checklist asks, "Is there excessive clutter in a bedroom?" what is your objective criteria for making that determination? Could be: (1) Is there a slip, trip, or fall hazard? (2) Are surfaces cleanable? (3) Are vents blocked? (4) Are there harborages for pests?

Code Requirements Related to Cleanliness

305.1 General.

- The interior of a structure and equipment therein shall be maintained in good repair, structurally sound, and in a sanitary condition.
- Occupants shall keep that part of the structure which they occupy or control in a clean and sanitary condition.
- Every owner of a structure containing a rooming house, housekeeping units, a hotel, a dormitory, two or more dwelling units or two or more nonresidential occupancies, shall maintain, in a clean and sanitary condition, the shared or public areas of the structure and exterior property.

302.1 Sanitation.

- All exterior property and premises shall be maintained in a clean, safe, and sanitary condition.
- The occupant shall keep that part of the exterior property which such occupant occupies or controls in a clean and sanitary condition.

307.1 Accumulation of rubbish or garbage.

- All exterior property and premises, and the interior of every structure, shall be free from any accumulation of rubbish or garbage.

503.4 Floor surface.

- In other than dwelling units, every toilet room floor shall be maintained to be a smooth, hard, nonabsorbent surface to permit such floor to be easily kept in a clean and sanitary condition.
- Section 503.4 is a good example of a standard to make sure surfaces are cleanable. However, the IPMC exempts dwellings. It applies to public and commercial buildings.

Most housing codes require a smooth, hard, nonabsorbent surface in bathrooms. In essence, this would ban carpeting in these areas. One requires it in kitchens. Given activities in bathrooms (and, to some extent, kitchens), hard, smooth, nonabsorbent surfaces are essential. Throw rugs are okay because they can be washed easily.

Key Messages

- Pesticides, allergens, and general chemicals in the home can cause allergic reactions, asthma and asthma exacerbation, and toxic exposure effects.
- Potential sources of allergens and contaminants in the home come from outdoor and indoor sources.
- Keeping a home clean includes controlling the source, creating smooth and cleanable surfaces, reducing clutter, and using effective cleaning methods.

Learning Objectives

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