

Rev. 3-2014 Ver. 5/2014

This presentation focuses on bed bugs. It covers the biology, behavior, and what you should do up to the point where the PMP gets involved. From there, follow the pest control company's procedure.

Reference: For an evaluation of bed bug control options, see:
http://www.nchh.org/Portals/0/Contents/bedbug_report.pdf

Outline

- What they are
- What they eat
- Where they live
- How to think like a bed bug
- Prevention and control

Also known as...
chintzes or chinchies
mahogany flats
red coats
crimson ramblers
wall lice
the bug that nobody knows



This is the outline for the presentation.

What is a bed bug?

- A blood-sucking insect
- Flat
- Range in size from a sesame seed to a apple seed
- Light brown to mahogany red depending when they last fed



Adult bed bug feeding on a human

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Why they're back

- ✦ Change in pesticide availability
- ✦ Change in pesticide use patterns
- ✦ More travel/ mobility of people
- ✦ More infested locations
- ✦ Pesticide resistance
- ✦ Lack of preparedness of society in general

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No one reason is to blame for the increase in bed bug infestations. They were never fully gone, but a bed bug treatment was uncommon for pest control companies. The rise has been referred to as "the perfect storm." Most likely it is a combination of all these factors that resulted in the situation we are dealing with today. Bed bugs are back, regardless of how they got here.

Bed bugs are health hazards

Bed bugs do not transmit disease, but they are a pest of significant public health importance

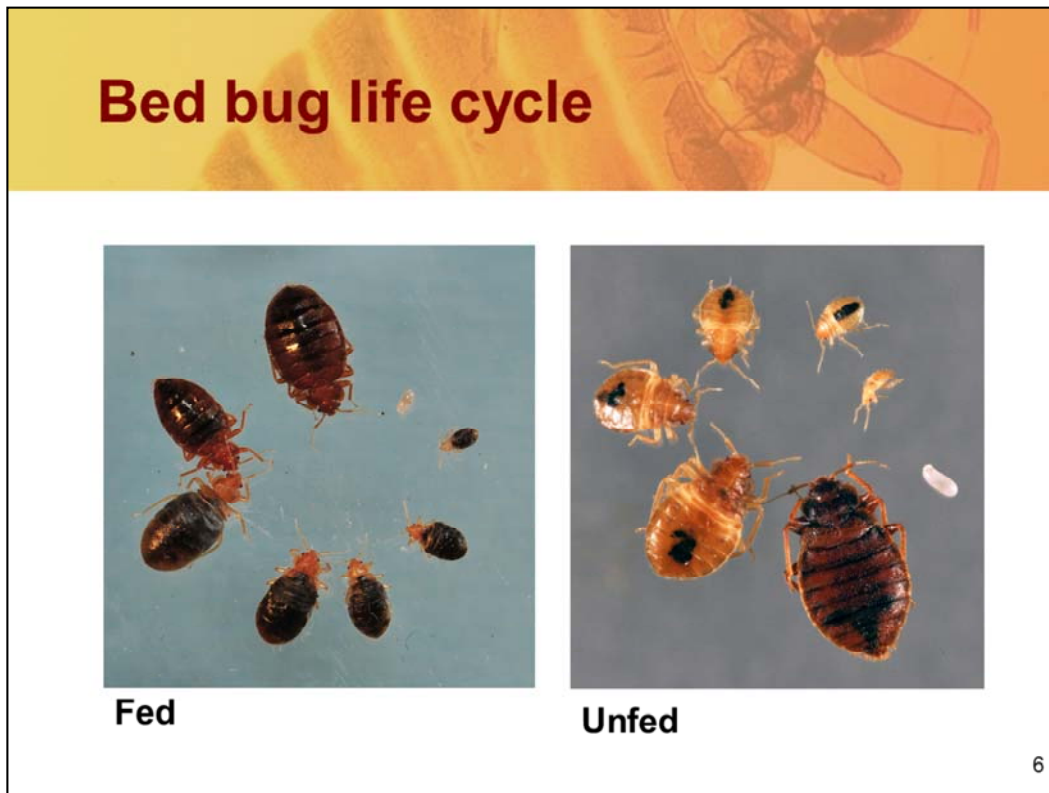
- ✦ Cause secondary infections after people scratch their bed bug bites
- ✦ Result in stress, loss of work, loss of productivity, loss of sleep, and financial burden
- ✦ Are unwelcome in our homes and workplaces

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Although bed bugs have not been shown to transmit disease, they do have an effect on physical and mental health. In 2010 EPA and CDC issued a joint statement, classifying bed bugs as a "pest of significant public health importance."

Physical effects could result from scratching the welts that show up on some people from the bed bug bite. The elderly and children may not have the self control to stop scratching and infection can result.

Many people with bed bugs cannot sleep and suffer negative effects. The stress from having bed bugs, having to treat them, and having to pay for it can take a significant toll.



Bed bugs can be two different shapes, depending on when they last fed. They expand when full of blood and quickly (within a few hours) digest the blood and poop out the excess so that they are flat again. A recently fed bed bug will be plump, but after it digests it is back to being flat.

Like cockroaches, baby bed bugs look like the adults, only smaller.

Bed bug behavior

- Most active at night
- Hide in cracks and crevices, often in groups
- Cannot fly, jump, or burrow into skin...they crawl
- Hitchhike on coats, bags, furniture, wheelchairs...



Bed bug crawling into a screw hole to hide

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Bed bugs will wedge into any crack that a credit card edge can fit into.

Although they are usually active at night, bed bugs will feed during the day if hungry. Most of the time, they are hiding in cracks and crevices near where they last fed. *Usually where there is one, there will be more, but they are not dependent on each other, so “loners” can occur. Hiding spots can be in the furniture where people sleep (sofas, recliners, mattresses, box springs, and bed frames), the furniture next to the bed, lamps, alarm clocks, picture frames on the walls, baseboards, the edges of the carpets, electric outlets, and draperies.*

They can get into other units and be carried home by staff members by hitchhiking on bags and used furniture (especially stuff that was picked up from trash) or by crawling into new units through walls.

Bed bugs will always be found crawling, never flying, jumping, or burrowing.

What bed bugs eat and drink

Blood



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Unlike cockroaches and rodents, bed bugs get both their food and water needs from blood. If there is a warm body, they can be happy. The baits intended for cockroaches and rodents will not work on bed bugs because bed bugs do not have chewing mouthparts to eat the bait. Also, boric acid (a stomach poison) will not work for bed bugs since they will not ingest it.

Can be confused with...

- Ticks
- Cockroach nymphs
- Other kinds of bug bites
- Allergic reactions to chemicals



Tick



Mosquito Bites



Cockroach Nymph



Bat Bug



Spider Beetle

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The photos are of a tick, mosquito bites, a cockroach nymph, a bat bug, and a spider beetle a few of the insects that have been found in the homes of people who thought they had bed bugs. Proper identification can save time, anxiety, and money. The only way to confirm bed bugs is to find live bed bugs, collect a few, and have a professional identify them.

Signs of bed bugs

- ✦ Bites
- ✦ Fecal spots
- ✦ Shed skins
- ✦ Dead bed bugs
- ✦ Live bed bugs



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Bed bugs are small and very good at hiding, so a flashlight is needed to see them (or evidence of them).

Keep looking until either a live bed bug is found or all involved feel satisfied that there are no bed bugs.

If bed bugs are found, a few should be put on tape or in a re-sealable plastic bag for identification.

The photo shows bed bugs that were snuggled next to the screw-in foot of a recliner. It took flipping the recliner over to find them. When the foot was unscrewed, more were found.

Bites

- ✦ Bed bugs cannot be confirmed by bites alone—bites do not show up on everyone
- ✦ Live bed bugs must be found



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There is a myth of bed bug bites always showing up in sets of three in a row: “breakfast, lunch, and dinner.” This is untrue. Bed bugs will come out of hiding to feed when they are hungry (usually once a week), feed until they are full, and then return to their hiding spots, leaving blood spots (bed bug poop) along their route. The bites in a row happen if there are any feeding along the sheet-human intersection or if one is disturbed mid-meal and has to reinsert its mouthpart.

Not everyone reacts to the bites, and a person’s reaction to bed bugs may change over time (not reacting at first, but then reacting after being bitten a number of times).

Fecal spots

- ✦ Fecal spots are bed bug droppings
- ✦ Different from frass—frass is gritty, fecal spots are smooth.
- ✦ A current bed bug infestation cannot be confirmed by fecal spots alone
- ✦ Live bed bugs must be found



A bad infestation

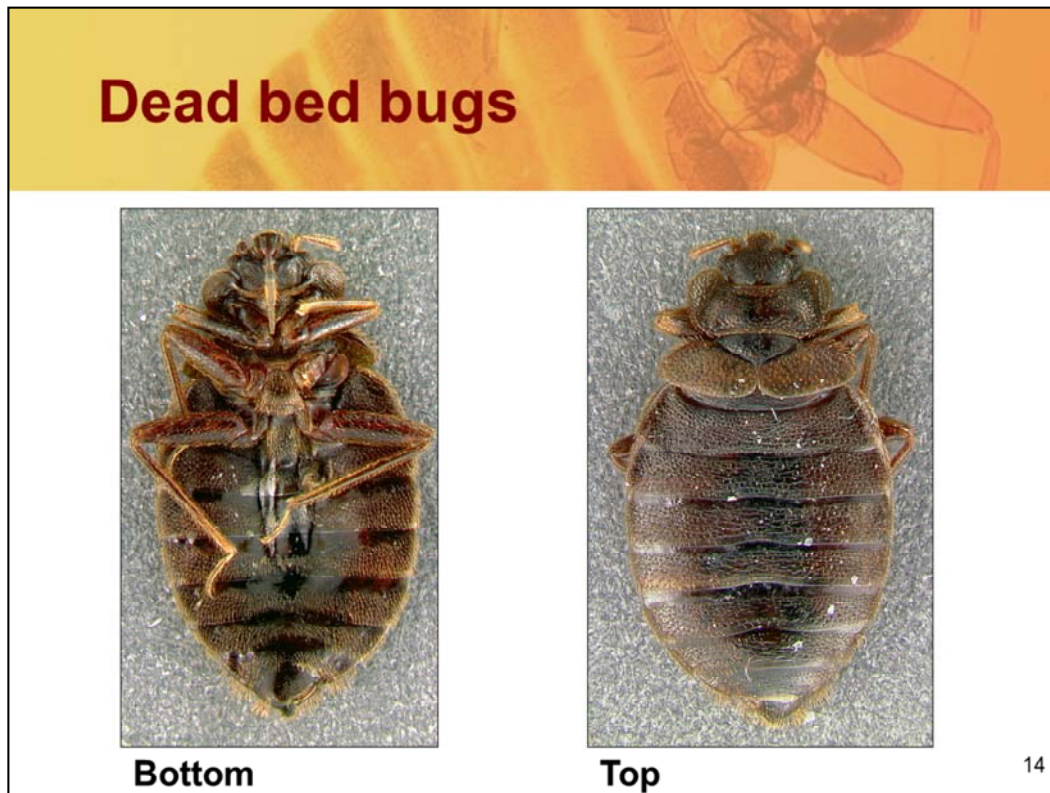
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Fecal spots are bed bug poop. Some people may have heard them called "blood spots." You may find blood spots on sheets where someone squished a recently fed bed bug, but fecal spots are small dark dots, like the dot a fine tipped sharpie would make. *Fecal spots will be found on sheets, pillow cases, mattresses, and around the spot where they are returning to hide.* Bed bugs often hide together (as evidenced in the picture above) but not always. Careful inspection with a flashlight must be done to find the spots where they are hiding...especially the loners. One pregnant female could restart an infestation.

You can distinguish fecal spots from cockroach frass. Frass is gritty, like pepper. Fecal spots are smooth.



Bed bugs don't have stretchy skin. When they need to grow up, they shed their outer layer—emerging as a larger version. They do this five times, going from the size of a poppy seed to the size of an apple seed. Shed skins look like hollow bed bugs and are the evidence of this growing process.



Bed bugs live for less than a year at room temperature. Dead bed bugs may be found in units that residents have tried to treat. This is particularly of concern if the bed bugs have been killed on the mattress. Many products are not labeled for use on mattresses. If you suspect the resident is putting pesticides on the mattress, someone should talk to the resident and make sure they are following label directions. We recommend vacuuming followed by steam, cryonite, or encasement for mattresses and box springs.

Where bed bugs live

- ✦ In the building
- ✦ In any crack or crevice where a credit card edge could fit
- ✦ In anything near where people rest



Mattress piping



Switch plates

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Sanitation plays a role in bed bug control because a cluttered apartment will be nearly impossible to treat. Bed bugs can hide anywhere, and cleaning will unearth them. Vacuuming and washing bed linens often will help keep populations from growing.



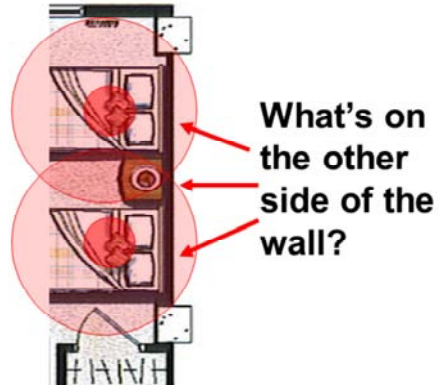
Bed bugs need blood to live, and blood is easiest to get when people are sleeping. So trainees need to look where people rest.

When bed bugs are suspected the locations in red should be inspected first.

The circles with dark red centers are the places within the unit where people are likely to rest: beds, sofas, and recliners. After feeding, bed bugs hide in nearby cracks. This increases the area one has to inspect to the lighter red ring. *Note that the potential infestation area now contains tables, lamps, walls, and carpets. Encourage trainees to think in three dimensions: carpets, table drawers, hanging picture frames, peeling wallpaper, and box springs. The units above, below, and sharing walls with these infestation sites might have bed bugs.*

How do bed bugs spread?

- ✦ Actively crawl along wires, pipes, and under doors
- ✦ Passively on anything coming from an infested unit (furniture, backpacks, laundry...)



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Prevention is key.

Since bed bugs are so reliant on humans, they have become very good at staying close to them. In public housing, one infestation can quickly spread throughout the development. The spread usually occurs when:

- residents in adjacent units do not inspect regularly, Bed bugs will travel along pipes or on wires if their food source is removed, or if the infestation gets too crowded. If a unit has bed bugs, all adjacent units should be inspected.
- management does not have the PMP inspect and possibly treat adjacent units,
- infested items are moved through the building without being wrapped in plastic,
- infested items intended for the trash are picked up and brought home,
- staff visits multiple units per day with bags or equipment
- residents visit each other carrying backpacks,
- or bed bugs are brought to the laundry room on bedding and people bring them home from this location.

If infested items are to be brought to the trash: 1. Cover the infested item with plastic for transport through the building. 2. Once outside, make the item unusable by breaking or cutting it open. 3. Put the broken item inside a covered trash receptacle. All these steps help ensure that bed bugs are not spread into uninfested areas within the PHA.

Areas at-risk for introduction and infestation

- Introduction is likely where people
 - frequently travel
 - set down personal belongings
 - sit or lay down for long periods of time
- Infestation is likely where bed bugs can
 - Crawl (upholstered furniture or bedding)
 - Feed on a person for 5 minutes without being detected
 - Hide in cracks or folds

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Inspect and monitor in these areas to detect bed bug infestations early-on.

Have trainees list areas in the building that are at risk for introduction AND infestation.

Inspection

- ✦ Always use a flashlight
- ✦ If bed bugs are found, inspect all adjacent units
- ✦ Two types
 - ✦ Visual
 - ✦ Scent detecting canine

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Inspections using a bed bug detection canine are especially useful in two scenarios. 1. When a person reports bed bugs but the PMP can't find any with visual inspection. 2. When a PMP wants to confirm that the area is bed bug-free, for example post-treatment. Canine inspections for bed bugs may identify emerging infestations in their earliest stages, helping property managers gain building-wide control before an infestation spreads to other units, saving considerable time and money.

Inspection with canines is useful for detection, but as with inspection by humans, there is potential for error. You should be able to verify the presence of bed bugs where the dog "alerts" the majority of the time. The dog's effectiveness depends upon the quality of its training, the ability and consistency of its trainer, and the conditions in the area of inspection. If trained and handled properly, bed bug-sniffing dogs can inspect much more effectively and in a much shorter time than a human. Contact the National Entomology Scent Detection Canine Association (NESDCA) for more information.

Monitoring

- Trap and kill bed bugs
- Determine how bad the infestation is
- Two types
 - Passive
 - Active



Passive, moat-style interceptor



Photo credit: FMC Corp.

Active, plug-in trap

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Monitors will not control a bed bug infestation, but they will trap and kill some. More importantly, they help find bed bugs or confirm their presence so that management can take further action. There are two types of monitors for bed bugs: passive monitors do not have an attractant and must be placed where the bugs will walk over them; active monitors have an attractant—a combination of heat, carbon dioxide, and an attractive chemical.

Reference: Rutgers University evaluation of monitoring devices:
<http://www.rci.rutgers.edu/~insects/bedbuginterceptor.pdf>

Got bed bugs? Now what?

- If found and controlled early in the infestation, the spread of bed bugs can be stopped
- Early detection and rapid response are critical to building-wide bed bug management
- Only PMPs apply pesticides

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From HUD's Notice PIH 2012-17: "The PHA should respond with urgency to any tenant report of bedbugs. Within 24 hours of the tenant report, the PHA should make contact with the tenant, provide the

tenant with information about control and prevention of bedbugs and discuss measures the tenant may be able to take in the unit before the inspection is performed. However, a bedbug inspection and, if necessary, treatment, may take time to schedule. The PHA should endeavor to take appropriate action within a reasonable time period using the guidelines provided below [in the Notice].

If someone finds a bed bug

Document all observations

Rapid response plan:

- Save the insect
- Report the problem
- Don't apply pesticides or move things around
- Prevent carrying the bed bugs to other places
- Have the PMP inspect the unit and adjacent units



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Refer back to previous discussions of the IPM log.

Collect a specimen on a piece of tape or in a jar with a splash of isopropyl (rubbing) alcohol in it.

Encourage a community response

- ✿ Educate everyone
- ✿ Destroy discarded items
- ✿ Housing should take the financial burden off of residents by providing
 - mattress encasements
 - monitors
 - large bags for furniture removal

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Mattresses and furniture with bed bugs do not have to be thrown away.

If mattresses are to be kept, use a fabric mattress encasement. Bed bugs can crawl out of tiny rips so the most important factor in using a mattress encasement is that it does not rip. Vinyl or plastic covers will not work. Encasements with bed-bug-proof zippers are ideal. The box spring can also be encased.

If no food is available within a few hundred feet or they are trapped, bed bugs will go dormant. They are thought to be able to live without feeding for many months. Because of this, it is critical that the mattress encasement stay on and intact (closed) for at least six months.

If appropriate, the mattress may be treated with pesticides available to a PMP. Pesticides should not be used on children's furniture or around chemically sensitive people. Steam or cryonite are preferred for killing bed bugs on mattresses.

Movement of infested items throughout the development may spread bed bugs. If items are moved through the building, make sure they are covered in plastic and made unusable once they are outside (cutting open the mattress in multiple spots will work).

Prepare before you have to

- Once bed bugs are present, you don't want to disturb the area
- Ideally, residents routinely
 - inspect with a flashlight
 - launder bedding
 - vacuum
 - maintain their unit according to housekeeping standards

Prevent introduction and spread: residents

- Manage items that come or go from the home
 - Keep coats, backpacks, purses, and bags off beds, recliners, and sofas at home and while out
 - Inspect used furniture carefully before bringing it home—avoid it if possible
- Look for signs when sleeping away from home

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Education throughout a development to help prevent bed bugs is worth the PHA's time.

Reference: Bed bug poster with a spot where contact info can be filled in.

Advice for staff, health aides, and contractors

- In units:
 - Avoid sitting or placing items on potentially infested surfaces
 - Wear a protective layer when moving infested items
- In the main office/community areas:
 - Replace fabric-covered furniture that has many crevices with plastic or metal items
 - Have residents set their belongings in plastic totes during meetings

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Explain to residents that these precautions (protective layers, plastic totes, etc.) are used community-wide to prevent spreading bed bugs between residents. They are never targeted at an individual resident. It is particularly important to have this conversation when working in a resident's home while wearing protective layers—you don't want the resident to think that you think they are unclean. Bed bugs are not associated with poor sanitation.

If you suspect you have bed bugs on your clothes, change to a clean pair and put the bed bug clothes in a hot dryer for 30 minutes.

Who is responsible?

- The PMP gives all instructions after inspection
- Assign realistic preparation responsibilities, taking into consideration financial, physical, and mental limitations of those involved
- Instructions are ideally carried out by the person who owns the materials

If they are unable

Family & friends
 Building staff
 Aides
 Nonprofit groups
 Contracted companies

If they are unwilling

Fall back on lease, job description, or other existing formal agreement

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The purpose of trash management to control bed bugs is to limit the chances that discarded, infested items will be brought back into the building. A team effort is necessary to control bed bugs.

It is not the job of the housekeeping or maintenance staff to clean all the units, but if support service staff know of residents who cannot inspect (poor eyesight, weak, or disabled), they should find a way to help the resident clean and inspect.

Suggestion: Make sure the question of who is going to take apart and reassemble furniture is answered.

Clutter image rating scale

Compulsive Hoarding and Acquiring Workbook

- If preparation is required, communicate expectations to the resident using a visual rating scale



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So that you can make sure the residents are prepared for treatment, ask your PMP about their preparation instructions and how tolerant they are of clutter. Use the Clutter Image Rating Scale as a reference.

Treatment options

- Vacuuming
- Isolation
 - Encasements
 - Clear bags
 - Closed plastic containers
 - Make the bed an island
- Freezing
 - Liquid CO₂
 - Chest freezer
- Heat
 - Clothes dryer
 - Steam
 - Container
 - Whole unit
- Pesticides
 - Spray
 - Dust
 - Fumigation

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Since bed bugs feed only on blood, control is different.

Although there are many things that a homeowner or resident can do to help treat bed bugs, this training encourages getting a PMP involved ASAP rather than taking time to treat the problem without one. Each pest management company should have instructions for residents on how to prepare the unit for a treatment.

Vacuuming

Every bed bug treatment will likely involve some vacuuming—even if it's just the floors to make the PMP's job easier. Vacuums are useful in medium and high infestations for getting rid of a lot of bed bugs relatively quickly without using pesticides. The same goes for cockroaches. We recommend using a bag vacuum with a HEPA filter and having a spatula or other tool available for dislodging bed bugs as you vacuum. As soon as you're done using the vacuum, take the bag out seal it in a plastic bag, and throw it out. If all you have is a canister vacuum, you can use that too. After every use empty the canister into a bag, tie it off, throw it away, and wash out the canister. Either way, if you have to shut off the vacuum mid-job, plug up the hose with a paper towel. This will prevent bed bugs from crawling back out the hose and will wipe the inside of the hose when you turn the vacuum back on. If a vacuum will be used in many different areas, inspect it to make sure you don't carry any hitchhikers.

If you don't want to deal with changing the bag, get one knee-high pantyhose and stuff the toe down the vacuum hose at the sucking end. Keep pushing it down the hose until about 8 inches are sticking out. Fold the open end of the pantyhose over the vacuum nozzle (like you fold a trash bag over the edge of a trash can) and secure it with a rubber band. Put the crevice tool on the vacuum hose over the pantyhose. The bugs will get trapped in the pantyhose and when you are done you can remove the rubber band, tie off the pantyhose, and pull it out for disposal.

Isolation

Encasements are discussed on the next slide.

Bed bugs can't claw or chew through plastic. They're also not great at climbing up smooth metal, plastic, or glass. Adding a light dusting of baby powder to the sides of a container makes it nearly impossible for them to climb up and out. You can take advantage of this in your management plan by using plastic totes, sealed bags, and encasements. Pulling the bed frame away from the wall and any surrounding furniture and putting insect interceptors under bed frame legs also isolates the bed.

Freezing

Two types of equipment will freeze bed bugs. Freezers that reach 0°F or colder can work for bed bugs. Although research is ongoing, it seems an object must reach 0°F for 3 days to kill all life stages of bed bugs. If it's not that cold, it will take longer. Household freezer temperatures vary too much to depend on.

PMPs may offer a freezing treatment that uses dry ice. The equipment is designed to spray the dry ice snow over objects—flash freezing the bed bugs and their eggs. Only a professional should use this method. This system isn't used exclusively, it's usually a good option for sensitive objects like fine art.

Heat

Bed bugs and their eggs die when exposed to anything that is 120°F for about 30 minutes. Some companies have equipment—including heaters, fans, monitors, and computer programs for tracking temperatures—to heat up an entire area. Not every large area can be brought to a high enough temperature for a long enough time. The key to any heat treatment is to get every inch of every object at least 120°F. Paper, clothes, and carpet are all insulators that may block the heat. The PMP will have to move objects around and use fans to get the heat everywhere. Bed bugs that hide behind switch plates or baseboards may crawl into the wall void and escape. To get those bugs, the PMP will treat the voids with a pesticide dust. You will have to prepare for a heat treatment because some common items can't take the heat.

Heat treatments are also available on a smaller scale. The same target temperatures and concerns apply. For luggage and other small items there are portable heat

chamber options that anyone can purchase and use. Larger objects can be isolated in a chamber and heated up.

The hot setting on a dryer is one of the best options for bed bug management programs because of accessibility and ease of use. Dry fabric will be de-infested after 30 minutes on the hottest setting in a dryer. Even dry-clean-only items can go in a dryer—it's water that these fabrics can't stand. If the fabric is wet, run the dryer for the full cycle.

Steam is another heat option. You can use a commercial-grade steamer to kill bed bugs and their eggs. The target temperature is still at least 120°F, but steamers get much hotter than that—around 200°F. That's hot. Be careful when using steam, both heat and water can damage objects and steam will conduct electricity. To ensure the killing temperature gets into every crack and crevice, move the nozzle head very slowly. To keep moisture down and reduce the likelihood of blowing bed bugs away without killing them, cover the nozzle head with a towel.

Pesticides that are legal for use against bed bugs will list bed bugs on the label. Most are sprays or dusts. EPA's bed bug website has a bed bug pesticide search tool. The label is the law—follow it closely. Even botanical products and other least toxic pesticides pose risks. If you have pesticide questions, call or visit the National Pesticide Information Center. Many pesticide products don't keep killing once they're dry (no residual). You may have to do some preparation in the area so that the PMP can access all areas for treatment.

For an in-depth discussion see *What's Working for Bed Bug Control in Multifamily Housing* at http://www.nchh.org/Portals/0/Contents/bedbug_report.pdf

Suggestion: if the PHA's PMP is present at the training, ask him or her what residents are instructed to do and have a discussion about who would help do this preparation for an elderly or disabled resident.

Use a mattress encasement

- Cover mattresses and box springs
- Ensure a snug fit, zip, seal, and check for rips
- Leave it on
- Cover any sharp points on the bed frame with tape or felt



**Mattresses and furniture
don't have to be thrown out!**

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Use fabric encasements designed for bed bugs. The encasement drastically simplifies inspection, making early detection easier especially on the box spring which has lots of spots where bed bugs can hide. The most common site of escape is through the zipper and bed bug encasements have special zippers. Most bed bugs will die within 5 months, but leave the encasement on and sealed just in case.

The PMP's role

- ✦ ALWAYS thoroughly inspects the reporting unit and the adjacent areas
- ✦ Provides site-specific preparation and follow-up instructions in multiple languages
- ✦ Follows the label
- ✦ Returns to inspect and treat if bed bugs are found

Only PMPs use sprays

- ✱ Sprays are not effective when used by homeowners for bed bug control
- ✱ Over-the-counter-sprays and foggers cause the bugs to scatter so the problem becomes harder to deal with



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Sprays should not have to be used by the PMP for cockroaches and rodents, but since there are few other options for bed bug management, sprays may need to be used.

“Do It Yourself” sprays may be repellent, causing bed bugs to move away from the treated area. Their use can spread the problem, making the bed bugs harder to deal with and MORE expensive for a professional to treat (because of a larger treatment area). PMPs have the expertise and products to treat bed bugs. Residents should focus their efforts on nonchemical control practices.

A 2013 study by Dr. Susan Jones at Ohio State University showed that total release foggers do not work for bed bugs.

Sprays should not be used in the units occupied by people with chemical sensitivities, or in adjacent or neighboring units, common areas (such as the halls, lobby, laundry room, elevator, or stairs), or along paths of travel. Infants and children, the elderly, and pregnant women are at greater risk for adverse health effects associated with exposure to pesticides and thus it makes sense to use reduced risk practices, follow label instructions, and practice prevention-based approaches that reduce reliance on chemical control measures.

Reference: Jones, S. and Bryant, J. 2012 "Ineffectiveness of Over-the-Counter Total-Release Foggers Against the Bed Bug (Heteroptera: Cimicidae)." *Journal of Economic Entomology*, 105(3):957.

A review of what you should do

- Educate everyone about what they can do to prevent bed bugs
- Prepare before bed bugs are reported by minimizing clutter and installing encasements and monitors
- Respond rapidly with a professional before the infestation grows and spreads

Questions?

