



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.healthyhomestraining.org/ipm/NCHH_Bed_Bug_Control_2-12-10.pdf

Outline

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

Also known as...

- chintzes or chinchies
- mahogany flats
- red coats
- crimson ramblers
- wall lice
- the bug that nobody knows



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This is the outline for the presentation.

What is a bed bug?

- A blood-sucking insect
- Most active at night
- Usually feeds at night



Adult bed bug feeding on a human

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Although they are usually active at night, bed bugs will feed during the day if hungry.

Bed bugs are health hazards

Bed bugs do not transmit disease, but they

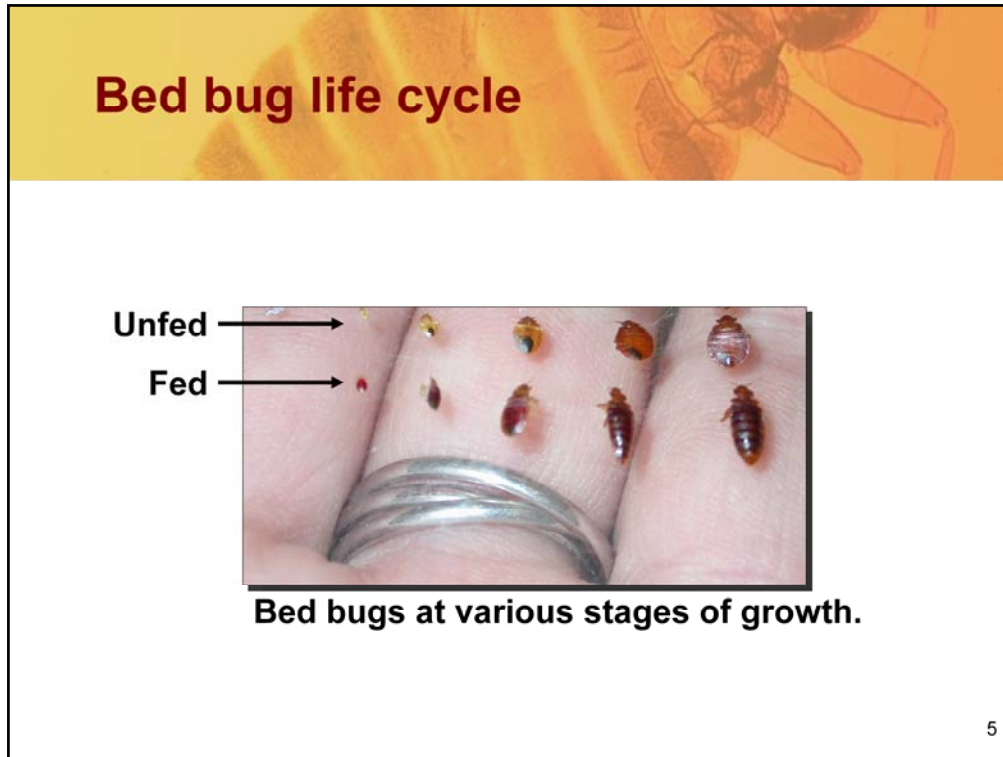
- ✦ cause secondary infections after people scratch their bed bug bites;
- ✦ result in stress, loss of work, loss of sleep, and financial burden;
- ✦ are unwelcome in our homes and workplaces.

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Although bed bugs have not been shown to transmit disease, they do have an effect on physical and mental health.

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.

There is an egg in the upperleft hand corner of the picture.

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

Bed bug behavior

- Hide in cracks and crevices, often in groups.
- Cannot fly, jump, or burrow into skin...they crawl.
- Hitchhike on bags, furniture, wires, or pipes.



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.


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.

Can be confused with...


- ✦ Ticks
- ✦ Cockroach nymphs
- ✦ Other kinds of bug bites




Mosquito Bites



Cockroach Nymph

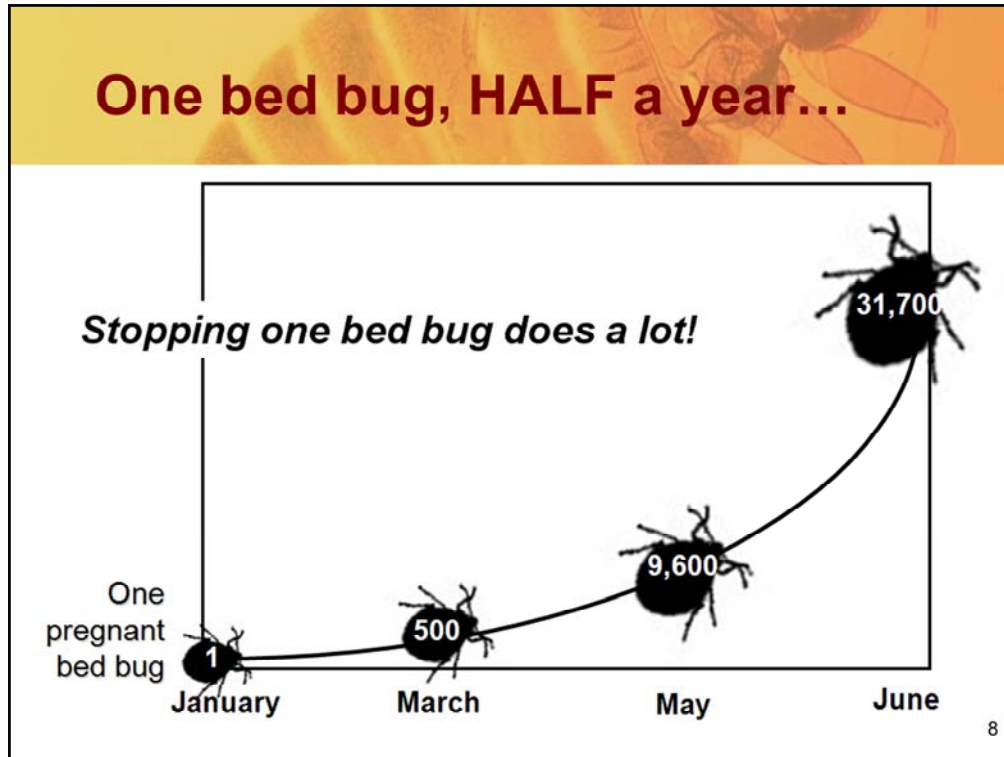


Bat Bug



Tick

The photos are of a tick, mosquito bites, a cockroach nymph, and a bat bug, 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.



Bed bug females live for about a year and can lay up to 500 eggs during that time. Eggs take five weeks to reach maturity, but many people react to bites from the nymph stages, too.

This graph assumes ideal conditions of room temperature and available food two months to reproductive maturity, one egg laid a day, 50% females and is only for six months. Because it assumes no death due to environmental influences, it is not completely realistic, but it does show how a problem could get out of hand.

Signs of bed bugs

- ✦ Bites
- ✦ Blood 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.
- ✦ 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).

Blood spots

- ✦ Blood spots are bed bug droppings.
- ✦ Bed bugs cannot be confirmed by blood spots alone.
- ✦ Live bed bugs must be found.



A bad infestation



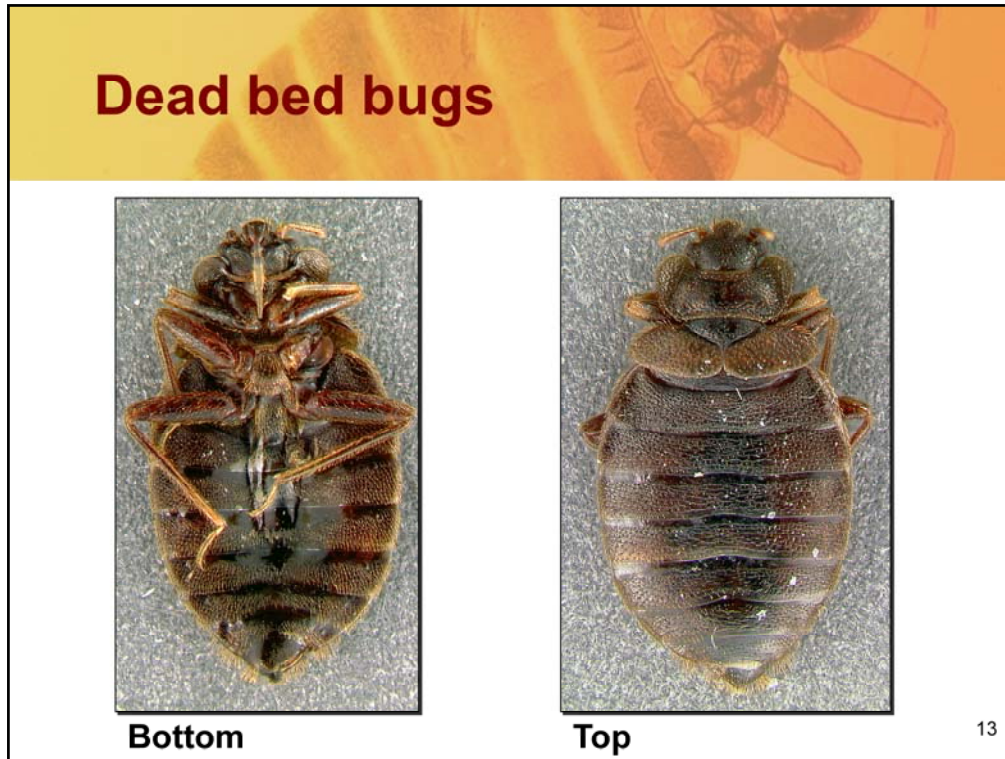
The start of an infestation

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Blood spots are bed bug poop. *Blood 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 on the left 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.



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 are thought to live about a year in room temperature with regular feeding. 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.

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.

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

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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.



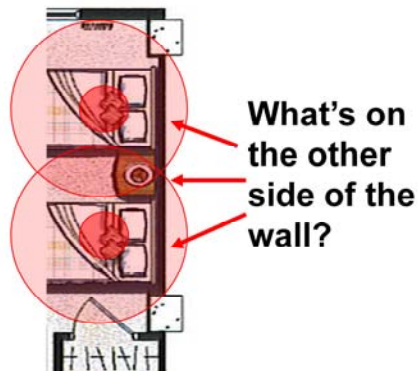
Bed bugs need blood to live, and blood is easiest to get when people are sleeping. So trainees need to look where people rest.

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?

- Through walls along wires and pipes
- 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.

Think like a bed bug

- After mating once and feeding, a female is ready to lay eggs.
- To avoid dying, a female may go off and find a hiding spot away from other bed bugs.



**Traumatic insemination
(bed bugs breeding)** 18

Although bed bugs are often found in clumps, they are not social insects. One pregnant female that leaves a group to avoid death from repeated stabs (being traumatically inseminated) can restart an infestation.

The fix is in the inspection. Thorough inspection in a clutter-free location with a flashlight is necessary to find all bed bug hiding spots and treat them.

Got bed bugs? Now what?

If found and controlled early in the infestation, the spread of bed bugs can be stopped.

The first responses should be to:

- ✿ Report the problem
- ✿ Not throw the mattress out—cover it
- ✿ Not spray—leave this to the PMP
- ✿ Prevent carrying the bed bugs to other places
- ✿ Prepare the unit for the PMP

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Bed bugs' diet is different from that of rodents and cockroaches, so 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, which will include laundering and cleaning.

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.

Document all observations

Take action promptly.

Report:

- ✦ Date
- ✦ What you saw
- ✦ What you did (don't spray)



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Refer back to previous discussions of the IPM log.

Use a mattress encasement

- ✦ Trap live bed bugs inside.
- ✦ Zip, seal, and check for rips.
- ✦ Leave it on for 1-1/2 years (don't let it rip).



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

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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 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 over a year. Because of this, it is critical that the mattress encasement stay on and intact (closed) for over one year.

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.

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).

Place monitors

- ✿ Trap and kill bed bugs
- ✿ Determine how bad the infestation is
- ✿ Two types
 - Interceptors
 - Portable



Interceptor

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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.

Interceptors trap bed bugs that are crawling on or off the bed. They will not work if there is no bed frame.

Portable devices each look different, but they all attract bed bugs and trap them. A person does not have to be sleeping in the room.

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

Teach people how to control without pesticides

- ✿ Follow site-specific instructions from the PMP
- ✿ If there is an infested item, the PMP may have the resident:
 - Encase
 - Destroy, dispose, and replace with metal or plastic
 - Heat treat in a dryer
 - Heat treat then isolate in bags or containers

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To successfully control bed bugs building wide, a PMP should be involved. Any disruption of the infested area could cause the bed bugs to spread, making control more difficult. Staff and residents should not use pesticides sold for bed bugs. Instead, follow the PMP's instructions for using non-chemical ways of killing them.

Encasements were discussed on slide 21.

A procedure for disposing of infested items is detailed in the notes section of slide 17.

If dry fabric is put in a dryer for 30 minutes on the high heat setting, then all bed bugs and eggs will die. If the resident is washing the fabric, they should do full cycles on the highest temperatures. Dry cleaning will kill bed bugs.

In severe infestations, the PMP may have the resident launder fabrics and then keep them isolated in a sealed bag or container until the unit is bed bug free.

Teach people how to prevent

- ✦ Keep coats, backpacks, purses, and bags off beds, recliners, and sofas.
- ✦ Don't bring home used furniture.
- ✦ Look for signs before sleeping.

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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.

Managing bed bugs manages other pests

- Encasing mattresses, vacuuming, and washing bedding will help manage dust mites. (Dust mite frass is the most common cause of asthma.)
- Keeping sleeping areas clutter-free gets rid of mouse and cockroach hiding spots.

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Reinforce this point that was made earlier in the course.

The PMP might

- ✿ Inspect
- ✿ Take apart furniture
- ✿ Put infested items in sealed plastic bags or discard heavily infested items
- ✿ Use
 - A vacuum
 - Heat or steam
 - Pesticides

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Much of bed bug detection and control relies on the residents, but once the PMP is involved he or she must inspect and find live bed bugs before treating.

Potential damage to items must be considered when using any heat treatment.

To be killed, a bed bug or egg must be exposed to 113°F for one hour or 104°F for 24 hours. *Killing temperatures can be reached in a dryer on hot for one hour.* The efficacy of treating a whole unit with heat has not been tested enough to be recommended and may be limited because bed bugs could leave the infested unit for an adjacent, cooler area.

Properly applied, steam will kill bed bugs and eggs. “Dry steam” units (that produce minimal vapor) will help avoid moisture problems after the treatment. *Steam has no lasting effect so the applicator must go over every inch of an infested item. Moving the nozzle at a rate of 1 foot every 10 to 15 seconds is recommended so that the killing temperature reaches deep within the item.*

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

Only PMPs use sprays

- ✦ Sprays are not effective when used by homeowners for bed bug control
- ✦ Sprays cause the bugs to scatter
 - 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.

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.

Do not use foggers and “bombs”



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Refer back to previous discussion.

A review of what you should do

- ✦ Report the problem
- ✦ Encase the mattress and box spring
- ✦ Prevent spreading the bed bugs to other places
- ✦ Follow the PMP's instructions

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Management's role

- Find out the PMP's requirements for unit prep and plan ahead! Example: Who takes apart and reassembles furniture?
- Have the professional inspect and treat units adjacent to the infested one.
- Communicate the situations/populations in units to the professional (respiratory problems, chemical sensitivities, pregnant women, the elderly, or children present).

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A team effort is necessary for the control of bed bugs. The next four slides summarize the roles and responsibilities of the team members. Everyone should act in a timely manner.

The PMP's role

- ALWAYS thoroughly inspects the unit and the adjacent walls.
- Provides preparation and follow-up instructions in multiple languages.
- Follows the label—especially when treating mattresses!
- Returns in three weeks to look for and treat hatched nymphs.

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Facilities, Maintenance, and Support Services's role

- Empty dumpsters weekly
- Damage furniture left out for the trash so it can't be reused
- Inspect the laundry room weekly
- Help residents prepare—educate and provide physical or financial support
- Be very cautious when working in units—never set items on or under beds, recliners, or sofas!

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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.

The resident's role

- ✦ Inspect regularly
- ✦ Launder bedding regularly
- ✦ Report bed bug sightings immediately and seek help from staff
- ✦ Use plastic bags when transporting infested items
- ✦ Don't bring home furniture found on the street
- ✦ Follow preparation instructions from the PMP

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Questions?



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