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Bed Bugs: What Residents Should Know?

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This presentation is part of a bed bug educational program sponsored by U.S. Environmental Protection Agency. The purpose is to educate residents in the prevention and control of bed bugs.

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But I thought that we could start out with a little bit of trivia.

Everyone is familiar with the old bed time rhyme “Good night, sleep tight, and don't let the bed bugs bite.” But does anyone know where this rhyme came from?

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Well it seems to have originated sometime in the 1800’s

Back then we didn’t have box springs, instead mattresses rested on ropes that were tightened with wooden dowels. So the tighter the ropes the firmer the support and the better the nights sleep, hence “Sleep Tight”

And because bed bugs were so common back then, well you know the rest..

But bed bugs were virtually eradicated from the United State in the post WWII era through the widespread use of chemicals like DDT and Malathion and were scarcely found in the U.S. for many years.

That is until recently when bed bugs began showing up again more frequently....



...That is until recently when bed bugs began showing up again more frequently, mostly in hotels and motels throughout the country during the late 1990's.

Most people would have thought that it was the low rate hotels that were affected but this wasn't the case. Instead it was mostly business class and four star hotels associated with business and leisure travel that were affected.

Quickly spread into residential sector

Apartments



Colleges & Universities



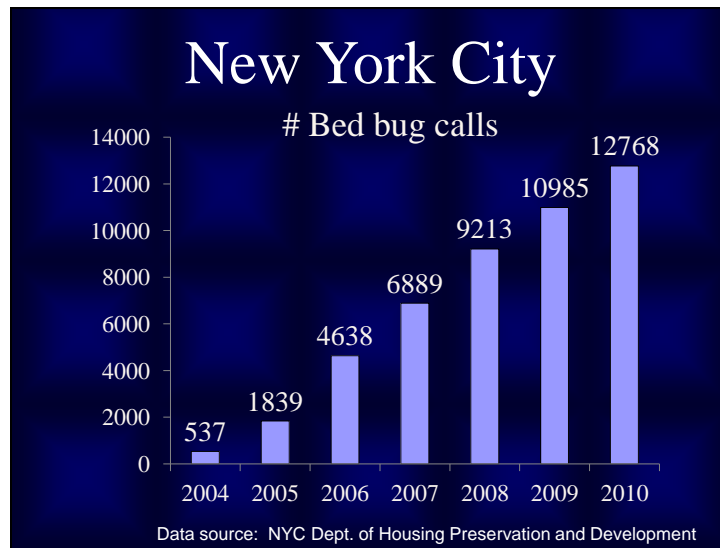
Single Family Homes



Bed Bug Central

It didn't take long before they spread into the residential sector where the multifamily housing industry was especially hard hit. They are also a common problem in university housing and even private homes in middle and upper class neighborhoods

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Recognizing that bed bugs were becoming more prevalent, NYC's Department of Housing Preservation and Development began to track reports of bed bugs, and as you can see since 2004 the bed bug activity in NY has been increasing at an alarming rate, with calls to the HPD increasing from just 537 in 2004 to nearly 13,000 in 2010.

But bed bugs are not limited to NYC, nor are they limited to large cities, in fact they are showing up in cities and rural towns in all 50 states.

And because they are such good hitchhikers they have...

Now bed bugs are found everywhere

- Hotels & motels
- Apartments
- Private homes
- College dorm rooms
- Schools and day care
- Used furniture outlets
- Furniture rental stores
- Moving/delivery vans
- Health care facilities
- Nursing homes
- Churches
- Airplanes & cruise ships
- Public transportation
- Laundries & dry cleaners
- Movie theaters
- Fire stations
- Youth hostels
- Jails

...And because they are such good hitchhikers they have spread from infested residential settings out into the community and are now being found just about everywhere. So when you look at this list instead of asking "Where are bed bugs found?" It may be more appropriate to ask "Where aren't we seeing them?" because they can be found virtually anywhere.



**Effective Bed Bug Management
is Best Addressed at the
Community Level**

Everyone needs to know:

1. That bed bugs exist
2. How to avoid them
3. How to recognize the signs & symptoms of an infestation
4. What to do if an infestation is suspected

So with bed bugs so prevalent in our society now, it is imperative that everyone is educated about bed bugs so we can effectively manage them in our housing communities. For this reason everyone needs to understand:

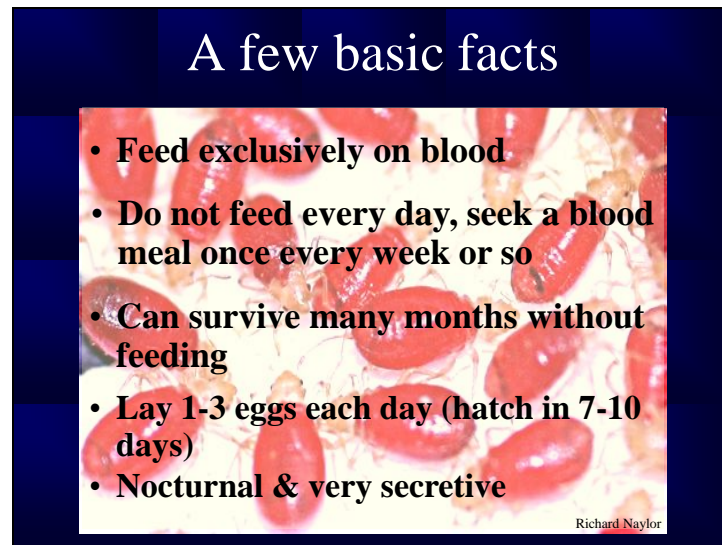
- That bed bugs exist
- How to avoid them?
- How to recognize the signs & symptoms of an infestation?
- What do if an infestation is suspected?

Some common misconceptions about bed bugs

1. They are not invisible, you can see them
2. They do not jump or fly, they crawl
3. They do not infest people, they infest structures and the contents of structures
4. They are not caused by poor sanitation, but clutter in the home can complicate control efforts
5. There is no reason to be ashamed or embarrassed, anyone can get them

So lets start by clearing up some common misconceptions about bed bugs

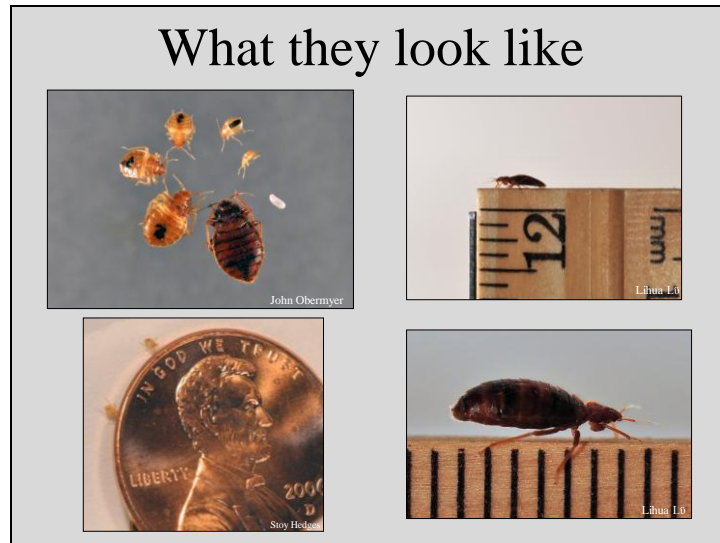
- Bed bugs are not invisible; you can see them with the naked eye although the young immature bed bugs and eggs are quite small.
- They do not jump or fly, they crawl.
- Bed bugs do not infest people; they infest structures and the contents of structures.
- They are not caused by lack of cleanliness or poor sanitation, but clutter in the home can certainly complicate control efforts.
- There is no reason to be ashamed or embarrassed, anyone can get them.



So now that we have cleared up some of the misconceptions. Let's take a look at a few important facts about their biology and behavior

What you are looking at here is the first stage immature bed bug that is fully engorged with blood.



- Bed bugs feed exclusively on blood which they require for development as well as reproduction.
- But they don't feed every day. Individual bed bugs may only feed once every week or so. This has a significant implications, because It means that only a fraction of the population will be exposed to treatment efforts the day the application was made, many will not encounter the treated surfaces until they leave their hiding places to seek a blood meal days later, when many of our materials are not nearly as effective.
- Bed bugs are also very resilient and can survive many months without a blood meal. This can result in big problems if an infested unit is vacated because once the host is no longer present it will promote dispersal of bugs to surrounding units and live bed bugs are most likely to still be present when it is re-occupied by a resident.
- They are also very prolific. Adult females lay between 1-3 eggs every day. The eggs are a well protected stage and don't hatch for 7-10 days. So it is important to realize that following the initial treatment eggs that were missed will continue to hatch over the next week or so new bugs will be entering the environment looking for a blood meal.
- And finally their nocturnal & secretive behavior can make them difficult to locate and control



In the previous slide you saw what the engorged first stage nymphs look like but when bed bugs are unfed they are flattened, wingless insects that cannot fly or jump. They are straw colored at the youngest stage, reddish brown at the adult stage. Before feeding, the adults are about the size of an apple seed, while the juvenile stages can be as small as a pin head. After feeding, they become swollen, and change to dark red color as they fill with blood.

Feeding

- Usually feed at night while you are sleeping
- Hungry bed bugs will feed any time
- A blood meal takes 3-10 minutes
 - May change feeding sites on same person during one meal
- Digested blood is excreted as black or brown fecal spots



As already mentioned, bed bugs feed exclusively on blood. They typically feed at night while people are fast asleep. The bites are painless so the person often has no idea that they have been fed upon. However, they will feed at any time of day or night depending upon when their blood meal is available and how much competition there is from other bugs in very large infestations.

It takes anywhere from 3-10 minutes for bed bugs to become fully engorged with blood and they may feed change their feeding sites while feeding the same host. As a result, a single bug can cause more than one bite reaction so the number of welts does not necessarily correspond to the number of bugs that fed.

And finally they digest and excrete the blood in a liquid form which leave stains that are referred to as spotting as you can see here on the bottom left and side of the image. Notice that the excreted blood droplet is no longer crimson red but is instead dark brown to black in color.

Many people who are looking for blood stains associated with bed bugs are looking for red blood on their sheets but this is not really what you should be looking for. The only way that you will get red blood stains is if a freshly engorged bug is squashed, similar to that if you were to squash a blood filled mosquito on your arm.

Instead you are much more likely to see the digested and excreted blood which we refer to as “spotting” which is typically dark brown to black in color and will appear as splotches on fabric or spots on wood surfaces.

Medical importance

- Do not transmit human diseases
- Reaction to bites vary
 - Delayed or no symptoms
 - Itching
 - Swelling
 - Pustules
 - Scarring
- Emotional impact
 - Loss of sleep
 - Nightmares
 - Stress/anxiety



Changlu Wang

Because bed bugs feed on human blood there is obviously concern regarding disease transmission. Fortunately, bed bugs have never been demonstrated to transmit diseases directly through their blood feeding activity and thus are not considered a vector of disease.

However because they do feed on blood people can develop bite symptoms and the emotional impact that accompany bed bugs can be significant. For these reasons while bed bugs may not be a disease vector they are still considered a pest of public health importance.

Reactions to bites can vary quite a bit from one individual to the next.

Some people exhibit delayed reactions of several days to a week or more, while other people never react at all, this is especially common among the elderly. Failure to develop bite symptoms coupled with the small size and secretive nocturnal behavior of bed bugs can result in the establishment of severe infestations before the bed bugs are eventually being detected.

When people do react to the bites, symptoms can include intense itching, swelling, development of pustules, and scarring

As mentioned bed bugs can also have an emotional impact on people who have been affected. Some of the more common problems that are experienced include loss of sleep, experiencing nightmares and suffering from stress and anxiety.

How bed bugs disperse

- Transported from infested areas on personal belongings
- Crawl from feeding sites to other areas in apartment
- Crawl to neighboring units through walls, utility pipes and hallways.




Dispersal of bed bugs occurs by both passive and active means.

Passive dispersal occurs when bbs are carried from one location to another on our personal belongings for example, they can be taken from infested homes into schools or places of work on back packs computer bags and sometimes clothing. Likewise they can be transported from one apartment to another during social visits.

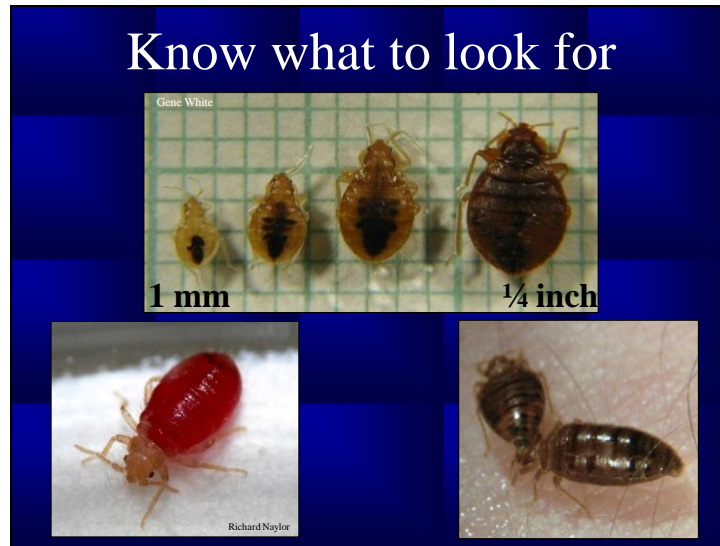
In addition to passive dispersal, bed bugs can also actively disperse between units in multi-occupancy dwellings by crawling from one unit to the next through shared walls, ceilings, and even down hallways. The higher numbers of bbs an apt has, the greater likelihood that bbs will spread into neighboring units.

Early Detection is Critical
Majority of bed bugs are associated with sleeping areas & upholstered furniture during the early stages



Low level infestations can typically be eliminated easily & inexpensively!

So you can see that early detection is critical, because when bed bugs are identified shortly after they have been introduced, say within the first few weeks, the infestations. Tend To Be Very Localized and are typically eliminated EASILY AND RELATIVELY INNEXPENSIVELY.



So it is important that you know how to recognize signs of bed bug activity so you can identify and report a problem to property management immediately.

You may see live or bugs but remember they can vary in size and color depending upon their developmental stage and can be flat or swollen depending upon if they have recently acquired a blood meal.



You should also be looking for other signs of bed bugs.

In this slide we can see everything. Live bugs, spotting, shed skins & eggs



You also need to know where to look for bed bug activity.

During the early stages of an infestation when only a few bugs are present you are much more likely to find beds associated with the box spring where they can remain better hidden, than you are to find them on the mattress. Check along the edges of the box spring, particularly around the corners, under the plastic corner guards or beneath the box spring.

As populations increase more likely to find on the mattress



As the number of bugs increases there is a greater likelihood that you will find them associated along the edges of the mattress



Sofas, couches and upholstered chairs are just as likely to become infested as is the bed. Pay special attention to pieces of furniture that you spend the most time sitting or sleeping on and be sure to look along the edges beneath the arms as well as along piping and under fabric skirts along the bottom of the furniture.

Items near beds or sofas



As infestations continue to increase bed bugs will begin infesting personal items and other contents of the structure. The closer the items are to sleeping and resting areas the more likely they are to become infested, like these shoes that were next to an infested bed.



Or this badly infested nightstand next to the bed. You can see the live bugs, shed skins, eggs, and fecal material.



And as infestations become more severe bed bugs will begin infesting items further away from sleeping and resting areas and can be found virtually anywhere like inside the bindings of these two books, on lace skirt of this stuffed animal and inside the head of an adjustable wrench.

Clutter makes elimination of bed bugs very difficult!



Bed bugs can be anywhere amongst clutter and are very difficult to deal with

So you can imagine what happens when we add clutter to the mix, bed bugs can be in virtually anything.

So you can understand why having clutter is such a problem. Clutter offers an unlimited number of places for bed bugs to hide and is very difficult to deal with because you can't treat people's personal belongings with pesticides.

In fact I would argue that clutter is the single biggest obstacle to overcome when it comes to eliminating bed bugs.



So How Do We Control Bed Bugs?

Bed Bug Central

Richard Naylor

This slide features a dark blue background with the central text "So How Do We Control Bed Bugs?" in a white serif font. It is surrounded by four photographs: top-left shows a large, brown, oval-shaped adult bed bug; top-right shows a cluster of small, white, oval-shaped eggs; bottom-left shows a group of smaller, translucent nymphs with several bright red, oval-shaped eggs; and bottom-right shows a close-up of a bed bug's head and legs.

Bed bug prevention



**Discarded furniture may infested,
don't pick up!**

The image contains two photographs. The left photograph shows a white upholstered chair and a shopping cart next to a green dumpster. The right photograph shows a mattress and a box spring leaning against a wall. Both photographs have a large red 'X' drawn over them. The text 'Bed Bug Central' is visible in small print at the bottom left of each photograph.

There is no absolute way to prevent bed bugs but there are definitely steps that you can take to minimize the potential for accidentally introducing bed bugs into your apartment

For example,

Avoid picking up discarded or second-hand items (especially beds & furniture). These days if its sitting by a dumpster or on the curb there is a good chance that it is infested.

Second hand items are also high risk



If you are going to bring used items into your home check them very carefully!

Likewise if you shop in second-hand stores like Thrift Shops you are increasing the risk of purchasing something that may be infested compared to purchasing new items. If you still plan on shopping for second hand items try and avoid buying furniture especially beds and upholstered furniture and carefully inspect any items that you do buy before bringing them into your apartment.

You can also hot launder any clothing that you purchase as soon as you get home and this will kill any bugs that might be associated with them.

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Frequently remove & launder bed linens



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Periodically inspect beds & upholstered furniture



Bed Bug Central

and



Bed Bug Central

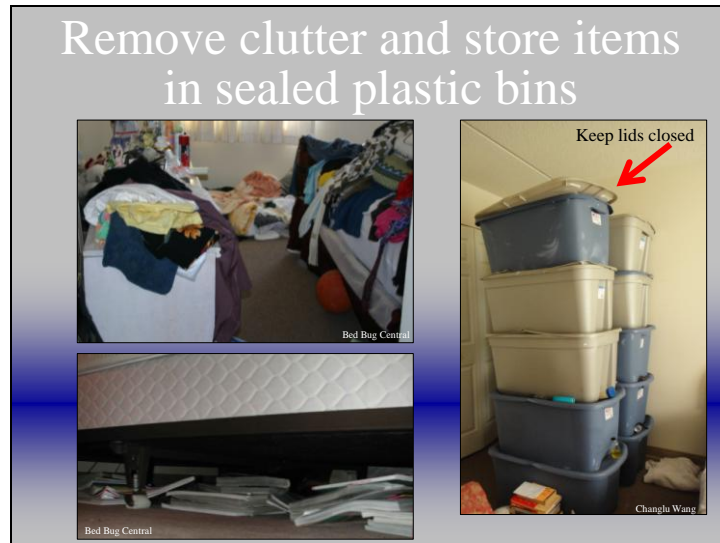
You should strip your bed and launder linens every week. Once the bed is stripped you can check it for signs of bed bug activity. This is also a good time to check upholstered furniture for evidence of bed bugs

Bed bug proof encasements for mattresses & box springs are a good idea



Bed bugs are easily seen on encasements and are prevented from getting inside mattress & box spring

It is a very good idea to purchase good bed bug proof encasements if you can afford to. Encasing mattresses and box springs will prevent bed bugs from being able to getting into the mattress or box spring where they can remain hidden from detection. Once encased, if bed bugs are introduced into your unit the bugs will be restricted to the smooth white exterior where you can easily see them and where they can be easily destroyed.




Eliminate clutter in your apartment especially under and around beds and upholstered furniture. De-cluttering will reduce bb hiding places and make the treatment much easier in the event you get bed bugs. If you do get bed bugs and clutter is present it will become create a major obstacle to control you will have wished you had reduced the clutter before bed bugs got into your personal items.

So it is a really good idea to go through your apartment and do some spring cleaning. Throw away things you no longer need and store items you don't use frequently in plastic storage bins with sealed lids. Make sure the lids are closed tight




And if you see anything that you believe may be bed bug activity or you begin to experience unexplained bite symptoms report it to management immediately. Don't wait; have it investigated right away because if it is bed bugs the sooner you confirm it the easier it will be to resolve the problem.


Save samples for proper identification




Spider beetle



Psocid



Immature roach



Carpet beetle shed skin

There are many similar looking pests.
It may not be a bed bug!

There are a number of other insects that are commonly found in apartments that can be easily confused with bed bugs. So if you do find something that you think is a bed bug save a sample by placing it in a plastic bag or vial with 70% rubbing alcohol so a qualified individual can examine it.



What happens in the event your apartment becomes infested? One of the first questions is what do I do with my bed?



The knee jerk reaction that typically occurs is to either discard the bed or treat it with insecticides, but neither is necessary.




Earlier I discussed encasements as a pro-active early detection tool, but they also play a very big role as a control tool.

Beds that are infested with bed bugs can be salvaged by encasing them in encasements specifically designed for bed bugs. These encasements are entry proof, escape proof and bite proof and will trap the bed bugs inside of the encasement where they will die of starvation.

It is also important that you do not remove the encasements. Even if they get dirty, do not remove them, think of them as the new outer surface of your bed. You can cover the encasements with linens and launder them.

If discarding infested beds,
furniture or other items

Contact
management
office for proper
disposal



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Improper disposal of infested items
can spread bugs everywhere!

In some cases beds, furniture or other personal items are so infested that people can't handle the thought of keeping it in their apartment.

If you decide that you want to discard any infested items, don't dispose of it yourself, make sure that you contact property management so it can be disposed of properly. Improper disposal will create even bigger problems.

As I mentioned this doesn't apply just to beds. You should contact property management for instructions on disposing of any infested items.

Interceptor devices on legs of beds, sofas and chairs



- Intercepts bed bugs as they travel to beds & sofas
- Provides relief, every bug caught was in route to feed

Interceptors are another very effective tool and are placed under the legs of beds and upholstered furniture.

These work by intercepting and trapping bed bugs as they migrate to furniture in search of a blood meal.




They help in evaluating if bed bugs are present and they can also provide relief because every bed bug that is captured is one less bed bug that will be feeding on the occupants of the apartment.



As I mentioned, hot laundering is another very effective method for destroying bed bugs.

The frequent laundering of items that can't be treated with pesticides like bed linens, clothing, or stuffed animals will greatly assist in eliminating bugs and eggs that may be associated with these items.

Heat or freeze items
that can't be laundered



Portable, plugs into
120 volt wall outlet
& reaches ~ 145°F

Freeze items for
4 days

For items that can't be laundered and another option is to place infested items in portable heating units or a household freezer for 4 days.

On the left hand side of this slide is a portable heating unit that simply plugs into the wall and bakes the infested items. If you are freezing items, seal them tightly in a bag before placing them into the freezer.

Avoid applying consumer pesticide sprays

- Many bed bug populations are resistant to insecticides.
- Application of sprays may cause bed bugs to disperse making them harder to eliminate.



One of the biggest mistakes that residents make is purchasing and applying pesticides on their own. I understand that it is very hard to resist doing this but the simple truth is that most of pesticides that you can buy are not very effective and in many cases can actually make the problem worse causing bed bugs to spread from areas that are treated to areas where they are harder to find and control.

Never use bug bombs!

Bug Bombs:

- Can lead to explosions if not used correctly!
- Are not an effective method for eliminating bed bugs!



Pesticide applications are best left to licensed applicators



So to avoid problems the application of pesticides should be left to experienced pest control professionals.

Diatomaceous earth dust is more effective than sprays

- Apply a very thin layer to cracks and crevices around sleeping and resting areas
- Avoid excessive application



Although I strongly recommend that you don't apply anything on your own. If you really feel compelled to use some type of product an effective and safe product that you can purchase is Diatomaceous Earth. This is essentially a non toxic dust that kills bed bugs.

Many people over apply dusts, you don't want to make an excessive application like you see here on the right. Instead it should be applied lightly into cracks and crevices where bed bugs hide. It is a good idea to get a bottle like this one that is designed to puff the dust out of.

Also don't confuse this with Boric Acid. Many people are familiar with applying boric acid for roaches. Boric acid does not work on bed bugs.

100% elimination of bed bugs
is rarely achieved in a
single visit

A Follow-up Program is Critical:

Follow up services will be necessary
until the bed bugs are eliminated

Eliminating bed bugs can be difficult and is rarely achieved in a single visit. So be prepared for continued follow ups until the problem is eliminated. The number of follow ups will depend upon how severe the problem was before it was reported as well as how much clutter you have and how cooperative you are in the eradication process



Remember!

- Avoid secondhand and discarded items
- Check for bed bugs before bringing things into your apt.
- Launder linens frequently (at least 1x per week)
- Reduce clutter (especially around sleeping/resting areas)
- Inspect beds & sofa's frequently
- Interceptors can greatly aid in early detection
- Encase beds for early detection & protection of beds
- Contact property management immediately if you suspect a problem with bed bugs
- Don't discard infested items on your own, contact property management
- Avoid treating the problem on your own and follow exterminator's recommendations

Richard Naylor

Remember

- Avoid secondhand and discarded items
- Check for bed bugs before bringing things into your apartment
- Launder linens frequently
- Reduce clutter
- Inspect beds & sofa's frequently
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- Encasing beds can aid in early detection & protect beds
- Contact property management immediately if you suspect a problem with bed bugs
- Avoid treating the problem on your own and follow exterminator's recommendations



Remember successful control is a team effort.

I use this graphic of a three legged stool because bed bug management requires equal support from the property management, pest control vendor and the resident. If any leg is not supported equally the stool will be off balance and will tumble over.

Residents must know their role, property management must be behind the program and willing to support it and step in when residents do not cooperate and the pest control provider must be capable of achieving results.

Additional information

- Web site
 - <http://www.epa.gov/bedbugs/>

Funding of this program is provided by U.S. EPA

For more information, please visit the following web site. Questions and suggestions may be sent to ...

I would also like to acknowledge the US EPA for financial support of this program.

I would like to thank you for your time and attention and open the floor for questions.