



BED BUGS

The following information was taken from Michigan's Manual for the Prevention & Control of Bed Bugs. Information has been added that specifically pertains to Manitoba.

For more information on Bed Bugs see the list of websites in the table to the right.

INTRODUCTION

For the past several decades Manitoba, Canada, and most of North America were virtually bed bug free. Bed bug infestations had become so rare that many entomologists and pest management professionals had never seen a live specimen, and bed bugs were no longer considered a public health threat. This was due primarily to improved living standards and widespread use of insecticides like DDT. Many people believed that these parasites were just an imaginary specter from a popular bedtime phrase, "...sleep tight, don't let the bed bugs bite!"

Recently, however, bed bugs have made a dramatic resurgence. Safety and environmental concerns have led to greater restriction of pesticides, and bed bugs have developed resistance to many widely used pesticides. Couple this with the transient nature of many segments of society, increased domestic and international travel, and we have a recipe for the rapid spread of infestations. In the past few years, bed bugs have been found in hotels, shelters, hospitals, universities, schools, apartments, and homes. Bed bugs don't discriminate, and will infest any human dwelling, from the most cramped student apartment to the most luxurious five-star hotel.

Bed bugs are difficult to control because they are so skilled at hiding, which allows them to travel in our belongings (clothing items, luggage, furniture, electronics, etc.) without our knowledge. Most people do not even realize they have visited somewhere with an infestation, and bring the bed bugs back to their residence. Once established in a residence or unit in a building, the bed bugs can travel between rooms or apartments on their own or on people's clothing or other belongings.

This blog has been created as a guide and reference tool. The blog covers bed bug biology, health concerns, and prevention and management of infestations. Fact sheets listed at the right may be used and reproduced as "stand alone" educational documents as needed.

Bed Bug Websites
Michigan's Manual for the Prevention & Control of Bed Bugs http://www.michigan.gov/documents/emergingdiseases/Bed_Bug_Manual_v1_full_reduce_326605_7.pdf
Manitoba Health http://www.gov.mb.ca/housing/pubs/pests/bedbugs.pdf www.manitoba.ca/bedbugs Bedbug hotline at 1-855-3MB-BUGS (1-855-362-2847)
Winnipeg Regional Health Authority http://www.wrha.mb.ca/healthinfo/a-z/files/BedBugs.pdf
Center For Disease Control http://www.cdc.gov/parasites/bedbugs/faqs.html
Health Canada http://www.hc-sc.gc.ca/cps-spc/pest/part/protect-proteger/bedbugs-punaies-lit/info-renseigne-eng.php
Sample Letters to Parents
Parent Notification Letters – Sample 1 & 2

SCHOOLS AND CHILD CARE CENTERS:

In general, schools and institutional child care center environments are not conducive to bed bug infestations. Bed bugs prefer an environment where they can hide during the day and come out at night to feed on a sleeping host. Because most schools and institutional child care centers do not provide this type of environment, major infestations of school and child care center buildings are rare. However, bed bugs hiding in clothing or backpacks can hitchhike to and from schools and child care centers, potentially providing a hub for bed bug spread. Because bed bugs can travel in belongings, it is prudent for schools and child care centers to keep individual children's belongings separate.

Currently there is no scientific evidence demonstrating that enforced exclusion policies are effective at reducing bed bug transmission in the school environment. If bed bugs were found on a student an appropriate response plan would include the following:

- Staff would be trained to identify bed bugs and the signs of bed bugs in the classroom and children's items. This may include actual insects, cast skins, or excessive insect bites on a child.
- Any student with bed bugs identified on their person or in their belongings may remain in school until the end of the day
- Respond promptly to bed bug complaints within the school and through contact and counseling with parents/caregivers. The longer bed bug infestations are allowed to persist, the harder they are to eradicate.
- Parents/caregivers should promptly respond to bed bugs in the home for the health and safety of the family and school community.
- An established school Integrated Pest Management Plan (IPM) plan.

NATURAL HISTORY OF BED BUGS:

Bed bugs are thought to have evolved from cave-dwelling insects in the Middle East that fed on bats and eventually started feeding on humans instead. Human bed bugs were noted in Greek and Latin literature long before the Common Era, and the insects rapidly spread throughout Europe with human populations. ***Cimex lectularius* is the species that is now infesting homes in North America.** Bed bugs live where people live because they only feed on sleeping humans. Thus, in Manitoba and elsewhere, they are found primarily in homes, apartments, hotels, shelters, and dormitories. The presence of bed bugs in human dwellings is not caused by a lack of cleanliness. They are an equal opportunity pest that only requires a warm, sleeping body and a place to hide nearby. Bed bugs have been found in both five-star hotels and homeless shelters.

BIOLOGY:

Bed bugs belong to the family *Cimicidae* in the insect order Hemiptera. All Hemiptera, or "true bugs", have piercing-sucking mouthparts to feed on plant juices, other insects, or the blood of vertebrate animals. The family *Cimicidae* includes many species that feed primarily on bats or birds, but only three species tend to specialize on humans. *Cimex lectularius* is the most cosmopolitan and is the species found throughout North America and Europe. The other two species (*C. hemipterus* and *Leptocimex boueti*) are found exclusively in tropical areas, with *C. hemipterus* being widespread in those regions.



Bed bugs are recognized and distinguished from other similar insects by their **extreme dorsal-ventral (back to stomach) flattening**, their lack of wings, and their reddish brown coloration after feeding. The flattening is not as obvious in blood-engorged individuals. They typically do not get larger than 7 mm (~1/4") in length. Infestations with bed bugs are sometimes associated with a **sweet, musty odor** produced by glands on the ventral (bottom) side of the thorax (middle body segment).

Life cycle:

Bedbugs go through five nymphal (immature) stages after hatching from the egg and before molting one final time to an adult. They require at least one blood meal at each stage. Adults may feed many times throughout their lifespan, every 3-7 days varying with temperature and other factors, with females requiring a blood meal to produce egg batches. Males may feed less frequently. Nymphal stages last from about 4 days to 24 days based on temperature and other environmental conditions. **Adults may live for more than a year.**



Under optimal conditions, the cycle from egg to egg can take place in under 5 weeks. However, the insects can go for long periods (up to one year under optimal conditions) between blood meals. Females must mate to lay eggs. Mated females lay eggs singly, cementing them to surfaces in crevices and protected areas away from but near a host sleeping area. They average 3-5 eggs per day but may lay as many as 12, producing **over 500 eggs in their lifetime**. As with other stages, the eggs are very durable and can remain viable for weeks under harsh environmental conditions.

Feeding:

The nymphs and adults locate hosts using **heat and carbon dioxide sensors**, and recognize human hosts through olfactory (smell) receptors on their antennae and mouthparts. Bed bugs normally feed late at night or early morning when the host is in deepest sleep.

Most people are unaware when being fed upon –

the bed bug is stealthy and its saliva contains desensitizing agents that prevent the host from feeling its mouthparts penetrate the skin. The bite sites are usually small, pinprick-sized lesions that may or may not become inflamed. Reaction to bed bug bites varies from person to person. Most people show no reaction the first time they are bitten, but subsequent bites may develop into welts that itch. Some people react severely with welts that itch for weeks, and individuals prone to keloid scarring may be affected dramatically. They feed for 3-15 minutes and then leave the host. **It is rare to actually find bed bugs feeding.** Once in their protected hiding spots, the blood meal is digested. During this process, they will defecate, leaving **reddish brown spots** that are characteristic of bed bug infestations.



Biology and Control Issues:

Bed bugs are remarkably resistant in almost every sense of the word, and are comfortable within all but the extremes of Michigan's climate. They can survive freezing temperatures (32° F) for days and tolerate much lower temperatures (5° F) for short periods. Their upper lethal temperature is 120° F causing death within minutes, but longer exposures to temperatures above 113° F are also lethal. They have a wide humidity tolerance range but tolerate dry climates better than humid, and **have been known to survive without blood meals for up to a year**. They spend most of their time hiding in small inconspicuous crevices that are difficult to reach with normal vacuum cleaning and "bug bomb" applications. By hiding in clothing, luggage, bedding, and mattresses, bed bugs may be accidentally transported to new locations. Bed bugs often choose to hide in box springs because they are undisturbed and offer many crevices and close proximity to hosts.



Although they are slow moving and prefer to stay where people sleep, they will eventually move if their host leaves, or if their resting place becomes too crowded with other bed bugs. If humans are difficult to find, they will seek blood from other warm blooded animals in the vicinity (eg. dogs, rodents, chickens, etc.).

At present, because of the stealthy habits of the bugs and their remarkable abilities to tolerate environmental fluctuations and host availability, it can be **difficult to eradicate** them once established. Many populations of bed bugs have also been found to be extremely difficult to kill with certain pesticides (this is referred to as “pesticide resistance”). Pyrethroid pesticides are the most common class of pesticides on the market today for both professional and consumer products.

Bed bugs collected from homes and apartments across the nation were studied for the degree of resistance or susceptibility to pyrethroid pesticides. The study showed 80% of the populations to be resistant in some degree to pyrethroids and only 20% of the populations to be susceptible. Some populations were extremely resistant to the point that they would not die unless pesticide was applied directly to their bodies. Several samples from Michigan bedbug populations were found to be highly resistant, but this does not mean that all bed bugs found in Michigan are resistant. Non-chemical means (e.g., steaming, vacuuming, and freezing) can be effective under certain conditions, but the variety of hiding places in most dwellings precludes total control with these methods. Circulating dry (convection) heating is the only non-chemical treatment currently available that is effective against bed bugs in all of their hiding places.

HEALTH CONCERNS ASSOCIATED WITH BED BUGS

What Activities Put Me At Risk of Encountering Bed Bugs?

Bed bugs carry a stigma and popular culture tends to associate their presence with poverty, filth and overcrowding, but none of these are requirements for bed bugs to thrive. Bed bugs are opportunists and are adapted to human activity. They live out their lives in close proximity to their slumbering human hosts. The following are common risk factors for bringing bed bugs home with you:

- Bringing uninspected, used or second-hand furniture (particularly mattresses and box springs), clothing, or electronics items into the home
- Staying in a shelter, hotel, youth hostel, group home, apartment building or dormitory where population turnover is high
- Travel, both domestically and internationally. Always inspect your luggage when returning home.

How Do You Know If Bed Bugs Are Biting?



When bed bugs feed, they inject a small amount of saliva under the skin. Some people do not react to the bites. In others, the proteins in the saliva can stimulate an immune response, leading to red, itchy swelling at the site of the bite. Some individuals become sensitized over time and repeated exposures, leading to more severe localized or even generalized allergic reactions.

The following should be considered if you are experiencing bites and bed bugs are suspected:

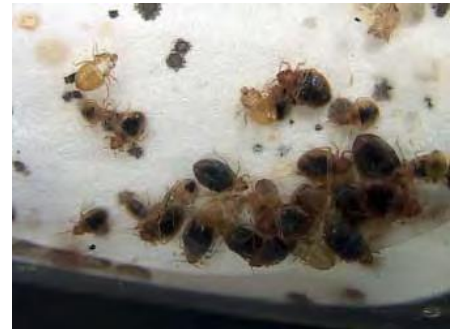
- Bed bugs generally feed on exposed skin not covered by clothing.
- Bed bugs typically feed during the night in darkened conditions.
- Rarely, they may feed during daytime hours if they have been denied a host for long periods of time.



- Bed bug bite reactions may occur immediately, or up to 14 days after the bite.
- A careful inspection of both the sleeping and living areas for the source of the irritation must occur. If bed bugs cannot be located after several careful inspections, then other biting pests or allergens must be considered.

Can Bed Bugs Make You Sick?

Bed bugs have been plaguing humans for millennia. Their blood-feeding lifestyle requires that they dwell in close proximity to their next blood meal, preferably people. While blood-borne pathogens have been detected in recently fed bed bugs, there is little evidence in the literature that they transmit communicable diseases between people.



- Anemia has been reported in the elderly and young children living in homes that were heavily infested with bed bugs.
- Studies in Egypt found that allergens excreted in bed bug environments can produce reactions in persons with asthma. The presence of bed bugs in a living environment may exacerbate symptoms in sensitized asthmatics.
- Even though bed bugs do not appear to transmit diseases, they are considered vermin. The presence of bed bugs in a dwelling can produce a range of physical and psychological discomfort in their human hosts, and infestations can be very difficult to remedy. As a result, bed bug infestations are considered a **public health nuisance**.
- Dwellings that harbor bed bugs may fall under the authority of state and local laws that address public health nuisances or sanitary housing conditions.

What Are Some Other Possible Health Effects from Bed Bugs?

- While bed bugs may not be responsible for transmitting diseases to people, they can have a profound psychological effect on those who experience bites. In addition to suffering bites, people often experience a strong repulsive reaction to the idea of being fed on by bugs when unconscious and unaware. This may manifest as mild to severe anxiety and stress.
- Because bed bugs can be transmitted between people, people suffering with an infestation may feel isolated from friends and family.
- Treating a residence for bed bugs can be difficult and expensive. Sufferers may have to dispose of infested furniture and belongings, leading to both financial and psychological stress.
- Some people are driven to take extreme actions to rid themselves and their homes of these pests, potentially harming themselves and their families with pesticides or other hazardous methods.

Is There An Effective Treatment for Bed Bug Bites?

Preventing feeding by effectively eliminating the bed bug infestation is the best method of treating the bites.

Treatment with topical or systemic anti-histamine or anti-inflammatory medications may provide some relief from a localized allergic reaction.

Topical insecticides such as those used for head lice and scabies, and repellants have no effect on bed bugs, and their use in the hope of preventing further bites may be dangerous.



INSPECTING FOR BED BUGS:

Because bed bugs can hide in the smallest cracks and crevices, you will not know where to treat until you perform a detailed inspection. Because eggs and freshly hatched nymphs are as small as 1 mm and translucent, it is easy to overlook them. Using the proper equipment and conducting a thorough inspection before you begin any control operation will assure the best results.

TOOLS & EQUIPMENT:

You will need at least the following equipment:

- **Flashlight** Bed bugs usually hide in dark crevices; without a flashlight, you may not see them. Use a bright flashlight (LED recommended) with fresh batteries.
- **Magnifying glass** At 1 mm, most people need a magnifying glass to clearly see bed bug eggs and freshly hatched bed bugs. Get a large magnifying glass to make close-up examinations easier.
- **Collection containers** (re-sealable plastic bags, tightly capped vials, small jars, etc.) You may need to keep the evidence you find. If you find insects that may or may not be bed bugs, you will want a specimen to submit to a professional for identification. Most pest management companies will identify pests for free.
- **Forceps, tweezers, or a thin probe** to help collect specimens
- **Probe** for checking cracks If cracks and crevices are too deep to inspect, you can use a metal spatula, putty knife, or other small probe to drive bed bugs out into the open. You can make a tool by cutting a long thin triangular piece from an old credit-type card, as illustrated. Compressed air can also be used to flush bed bugs from hiding places in tight cracks.
- **Hand tools** for gaining access to outlets, access panels, etc. You may need to remove access panels or outlet covers to inspect for bed bugs. A selection of screwdrivers, pliers, and an adjustable wrench may come in handy.
- **Alcohol wipes, baby wipes, or alcohol and cotton swabs** If you find spots that may be bed bug fecal stains or droppings, you can wet them with an alcohol swab, wipe, or baby wipe and look for a red or reddish brown color on the wipe. This will help you distinguish between bed bug droppings and dirt/lint or other matter.



WHAT TO LOOK FOR:

You will be inspecting for live or dead bed bugs, cast skins, eggs, and fecal stains or droppings. In a light infestation, there may be little to see.



Bed Bugs Live or Dead Live bed bugs may be crawling around their harborage or sitting quietly in a crack or a crevice. Newly hatched bed bugs are beige and difficult to see until they have had a blood meal. Bed bugs that have fed have a dark digestive tract and can be seen much easier than unfed bugs (see illustration). As they mature, the bugs become darker and easier to see on light colored backgrounds. Dead bed bugs are frequently found in or near the harborage and often with their legs and antennae broken off.

Cast skins Bed bugs grow by shedding their skin (molting) and leave a shed skin behind after each molt. The skins look like empty shells of the bed bugs about the same size as the bed bug stage that left it. They are extremely light and will blow away at the slightest breeze.



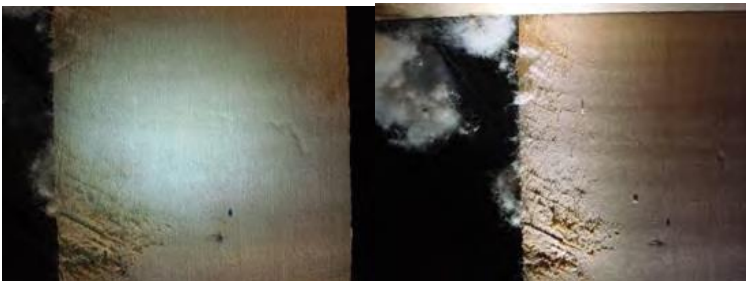
Eggs Although they are only about 1 mm long, bed bug eggs are white and will show up well in a number of situations. They are more visible on dark backgrounds or smooth surfaces. Females have a tendency to lay eggs around their harborage areas. A cluster of eggs is a pretty good indication that there is a fertilized female nearby. Frequently, she will be hiding in a crevice just out of sight.

Fecal Stains & Droppings The droppings appear as small dark or black spots and are frequently the easiest to spot of all the evidence. A grouped arrangement of droppings suggests a closer search of the area. Droppings may appear as solid blobs or as thin ink-like stains. They can be seen as blood spots on sheets and pillows. The illustrations show moderate to heavy infestations, but in lighter infestations, there may be only a few spots.



HOW TO LOOK:

Begin your search where people sleep and move across the area in a systematic fashion. It is important that you inspect all habitable crevices, and developing a method for ensuring you inspect each area can help prevent missed areas. It has been suggested from an informal study that 90% of the bed bugs can be found in mattresses, bed frames, nightstands, and upholstered furniture.



While bed bugs can be found virtually anywhere, you should begin your search in the high probability areas, normally within 15-20 feet of the sleeping area.

Hold your flashlight parallel to the surface being inspected to reveal eggs and newly hatched bed bugs. With the light being shone from above, they may blend in to the background, but a flashlight held parallel to the surface will cause eggs and small bed bugs to cast a shadow that is easier to see.

Inspecting the Bed:

Inspection for bed bugs starts in the place where people sleep and moves out from there to other parts of the room. This inspection should be conducted before room preparation steps are taken.

Mattress inspection should focus on the following areas:

- Along the top and bottom seams, and along each side of the piping material sewn onto these edges
- Under mattress handles and along or inside air holes
- Between the mattress and box spring, platform or frame
- Inside folds of material and under buttons
- If mattresses are covered in vinyl plastic, look inside seams and rips in material
- Use alcohol or baby wipes to rub suspected bed bug droppings - if the spots dissolve into a reddish brown color, this could indicate bed bug droppings and should be a reason to continue inspecting until a live bed bug is found.



Box spring inspection should focus on the following areas:

- Points where the box spring sits on the bed frame (lift slowly to avoid scattering bed bugs).
- The top surface of the box spring, inside folds of material.
- Along seams and where the material is tacked to the frame.
- Underneath the fabric cover - turn over the box spring and remove the thin cloth layer on the underside .
- Use a flashlight, a magnifying glass and a crevice tool to check the spaces between box spring frame parts .
- Look around and beneath furniture staples and tacks.
- Use a flushing agent like compressed air to chase bed bugs out of hiding spots.



Bed frame and head board inspection

- Wood beds and head boards (especially wicker) are preferred hiding spots for bed bugs over metal bed frames, but bed bugs will hide in crevices on metal and plastic, or where a mattress touches a metal frame.
- Visually inspect and use the crevice tool in all joints of the frame where parts meet.
- Turn the frame over and inspect from the underside, check screw and nail.
- Remove the head board from the bed and check for bed bugs along the joints and on the wall behind it.
- Double faced tape or carpet tape can be placed on the underside of furniture to capture wandering bed bugs. This is a monitoring tool, not a control strategy.
- Wicker furniture provides infinite hiding spots for bed bugs. Anything made of wicker should probably be discarded. See below for instructions on disposing of infested items.



Inspecting Other Furniture near the Bed:

Furniture such as night stands will be likely places to find bed bugs, since they are close to sleeping hosts. As the bed bug population grows, overcrowding may force them to harbor farther away from their host.

- Empty drawers and shelves of the furniture closest to the bed, and place items into plastic bags to be inspected and cleaned.
- Electronics, such as lamps, remote controls, alarm clocks, and radios should be placed into plastic bags for further inspection and possible treatment.
- Pull out drawers and inspect every corner and the undersides, using a crevice tool to check under the metal drawer guide.
- Use the crevice tool to inspect gaps wherever the tool will fit, such as between the shelf and bookcase frame.
- Turn over all furniture to inspect the underside.
- Be sure to inspect screw and nail holes.
- Plastic and metal furniture can also harbor bed bugs, follow the same inspection procedures.
- Office-style chairs should be inspected by turning them over and checking screw holes and seams where fabric attaches to the frame.



Inspecting Plush Furniture:

Plush furniture, such as a couch, will harbor bed bugs, even if residents are not sleeping there. In these cases, inspection will be more difficult due to the many inaccessible hiding spots.

- Inspect pillows and cushions, particularly the seams and the folds around zippers.
- Look at, and under legs of chairs and couches.
- Turn over the furniture and remove the thin cloth backing under each piece.
- Pay special attention to staples and where material is stapled to the frame.
- Look inside at all wood parts of the frame.
- If the piece is highly infested, consider disposing of it in a proper manner (see furniture disposal guidelines).



Inspecting the Room Perimeter:

Once established, bed bugs will spread toward the perimeter of the room, including walls, moldings, and rugs.



- Look at moldings or the joint between the floor and wall closest to the bed.
- Use the crevice tool to check behind moldings. The tool will chase bed bugs out of hiding if used in a sweeping motion.
- Fold back the edges of wall-to-wall carpets to inspect for signs of bed bugs.
- Pay attention to the tack strip of carpets.
- Look under the edge of area rugs.
- Using a screwdriver, remove electrical switch and outlet, and phone jack plates to inspect. If bed bugs are hiding in these areas, signs may be evident along the edges and on the back of the plate.
- Inspect everything hanging on the walls. If framed art or photos are present and there is evidence of bed bugs nearby, open the frame to inspect inside or under the paper backing.

- Check under loose wallpaper and areas of peeling paint.
- Take down curtain rods and inspect inside them and underneath hardware on the walls.
- Look at closet, bathroom and other door frames, along hinges, and in the bore hole for the latch on each door.
- Make a note if bed bugs are found on walls. Ceiling lights and fixtures with bed bugs could indicate that they are moving from a room or unit above.
- If bed bugs are on walls, they may hide under ceiling moldings and in smoke detectors.



Inspecting Unusual Locations:

Bed bugs may turn up in unexpected places in moderate and large infestations. If the infestation is large, every object in the affected area should be carefully inspected. Bed bugs have been found in such locations as:

- Television and other remote controls, in the battery compartment
- Telephones, cell and cordless phones
- Lamps and alarm clocks
- Computers and other electronics
- Cardboard boxes in closets and under the bed
- Children's toys and stuffed animals
- Jewelry boxes
- Brick walls and "popcorn" or other textured ceilings
- Books, magazines, newspapers, and files
- Inside hollow doors
- Ceiling light fixtures
- Smoke detectors
- Heating units
- Air conditioners and ducts
- Wheelchairs



Signs of Room-to-Room Spread:

Often, bed bugs infesting a room or unit will make their way to an adjacent room or unit through electrical, heat and phone line conduits. It has even been documented that bed bugs can cross hallways and move between units under doors. It is important to identify cases where this happens and address the problem from both sides of the wall or hall.

Evidence that may suggest room to room movement of bed bugs includes:

- Bed bugs in ceiling light fixtures
- Bed bugs hiding in and coming out of electrical and switch plates on walls and bed bug droppings found on the inside of the switch plates, or near ducts
- Bed bugs frequently found in unusual locations, such as the kitchen or bathroom. In such a case, it may be that the kitchen or bathroom is located adjacent to an infested bedroom or heavily infested unit, and bed bugs are traveling along water pipes.

IDENTIFICATION



Prior to undertaking any treatment, a positive identification of the pest should be made by a professional. IPM treatment is tailored to the specific pest. Most pest management companies can provide this service. Pest identification services are also available to the general public in Manitoba through the University Diagnostic Services.

What to do if a bed bug is found at school:

If a bed bug is found on a child in school or child care center, it does **not** mean the child brought the bed bug into the school or child care center. Bed bugs do not infest people, they only feed on them. Bed bugs can crawl onto or off of a person (or their belongings) at any time. If a suspected bed bug is found on a child, a child's belongings, or anywhere else in a school or child care center, the following procedures should be followed:

1. If the bug was found on a child or a child's belongings, the child should be discreetly removed from the classroom so that the school nurse or a qualified individual can examine the child's clothing and other belongings. Any bugs found should be removed and collected for identification. Try to keep the specimens as intact as possible.
2. The school principal or center program director should contact their School Division Safety Officer or local pest control center for assistance in identifying the specimen(s). It is important to confirm that the bugs found really are bed bugs before proceeding.
3. If the specimen is confirmed to be a bed bug, then the school principal or nurse or center program director should notify the affected class or classes. See page 1 for a sample parent notification letter.
4. If a confirmed bed bug was found on a child, then the school principal or daycare center program director should inform the child's parents or guardian by phone. Contact the Divisional Safety Officer or Facilities & Operations custodial supervisor to arrange for the bed bug dog or pest services contractor to attend the facility.
5. In most instances, students should not be excluded from school or child care due to bed bugs. Schools and child care centers should not be closed due to the discovery of bed bugs. As discussed above, infestation of a school or child care center building is unlikely, rather the school or child care center may become a source of dispersal to others in the school environment. For instance, bed bugs brought into the school in a child's book-bag or on their clothing could drop off in the classroom or in a locker. The bed bugs might then be picked up and taken home by another student or staff member inadvertently.
6. For children/students who repeatedly come to school with bed bugs, institute clothing and school item sanitation:
 - In an infested home, parents should store their child's freshly laundered clothing in sealed plastic bags until they are put on in the morning. This prevents bed bugs from hiding in the clothing and being carried to school.
 - Backpacks, lunchboxes, and other items that travel back and forth to school can also be inspected daily and stored in sealed plastic containers at home to prevent bed bugs from getting into them.
 - At school, the student could be provided with plastic bags or bins in which to store their belongings in order to prevent any bed bugs from spreading to other students' belongings.

7. In the unusual instance where a child repeatedly reports to school showing evidence of bed bugs despite previous notification, education, and counseling with parents, further investigation is needed. Repeated bed bug presence may be due the following:
- Inability of parents/caregiver to recognize the scope of an infestation at home.
 - Failure to effectively treat a recognized infestation – this might be due to pest management failure, landlord/tenant dispute, lack of financial resources, repeated re-infestation from outside of the home (all places a student sleeps or visits, consider family members as well), non-vigilance or lack of concern on the part of the parent.
 - Failure to adhere to recommended clothing and school item sanitation recommendations
 - Investigate other sources of bed bugs on school property such as lockers, buses, common areas or other areas where students routinely congregate (contact the Divisional Safety Officer or F&O custodial supervisor for treatment/inspection options).

If any of the above issues are thought to be the cause, targeted intervention may be warranted:

This may include treatment of school facilities and property if an infestation is found in the school or on busses. Ongoing pest management should be overseen by the school principal and facilities director.

Investigative work may be required to figure out where repeated bed bug findings are originating. If a parent is or claims to be diligently dealing with an infestation and the student continues to come to school with bed bugs, there may be an alternative source or reason that the parents haven't been successful. Things to consider are:

- Where the child spends time after school, before school, or with other family members. Any of these places could have an infestation and the child may be bringing bed bugs from this location or bringing them back home to the detriment of control efforts.
- Cars and other modes of transportation can become infested. Inspect all the modes of transportation the child uses.
- Parents need to cooperate with the preparation of the home for treatment. This includes all of the pest management professional's pre-treatment instructions. If these instructions are not exactly followed, treatment failure may result.
- While bed bug treatment is ongoing, it is important to remain vigilant in keeping bed bugs out of clothing and personal items brought to school. Schools may want to suggest or require having a spare set of clothing sent for the child in a sealed plastic bag. If bed bugs are found, have the child change into the clean clothes and place infested clothes into the bag. Clothing may also be placed in a hot dryer (highest heat setting, include shoes) for 30 minutes prior to the child dressing in the morning. High heat will kill all stages of bed bugs.

The treatment of a bed bug infestation can be very costly. In instances where a family is having financial difficulty and cannot afford professional treatment, the family should be directed to contact the Manitoba Housing Authority (MHA) immediately. The MHA does not recommend that you treat pest problems on your own, because you may cause further infestations. **Call the Manitoba Housing Authority's Housing Communication Centre at 204-945-4663 in Winnipeg; or toll free at 1-800-661-4663 or the toll-free bedbug hotline at 1-855-3MB-BUGS (1-855-362-2847), 7:30 a.m. to 4:30 p.m., Monday through Friday.**

In cases where tenant/landlord dispute is delaying effective treatment, parents should be directed to contact the local housing authority, By-Law enforcement agency or Dept. of Health. They can help to coordinate the treatment of properties by promoting cooperation between all parties involved, provide an expected timeframe for mitigation, and assess fines if progress isn't made.

Bed bug infestations are not only an individual family and school concern, but are of concern for the entire community. The longer bed bug infestations are allowed to persist, the more likely it is for spread in the community and any place that people congregate for long periods may become a hub for this spread. Individuals and institutions have their respective responsibilities, but it is incumbent on the community itself to attempt to help its members, particularly those less fortunate, to address an infestation. Be aware of

emerging issues that are impacting community members and work to address these issues in the community.

While the information outlined above do not generally support exclusion of a student for bed bugs, in some cases this option may need to be considered or utilized for resolution of the situation. Exclusion alone will not solve a bed bug infestation, but may serve to prompt stronger or more effective measures at home.

What can be done to eliminate bed bugs from a classroom? (Information is from the MTS website)

- DO NOT allow untrained staff to apply pesticides on school property. Be sure to adhere to provincial regulations with any application of pesticides (even ready-to-use products like sprays) in schools.
- Backpacks, lunchboxes, and other items that travel back and forth to school can also be inspected daily and sealed in plastic containers to prevent bed bugs from getting into them at home.
- Hard surfaces can be cleaned with standard cleaning products.
- If bed bugs have been found repeatedly in a particular classroom, have the room inspected and treated by a pest management professional or other trained staff, while always adhering to provincial regulations.
- Contact the Divisional Safety Officer or Facilities & Operations Custodial Supervisor for help.

What if students have an infestation at home? (Information is from the MTS website)

When a student is dealing with an infestation at home, it is important to be sensitive to their problem.

Bed bugs have nothing to do with cleanliness or socioeconomic status. However, there is still a stigma that can come with having bed bugs. As a result, parents may be hesitant to admit to having bed bugs, and students may not want others to know they have an infestation at home. Students living in an infested home may also feel anxious or tired during the school day.

Schools should work with the parents of any student living in an infested home to develop strategies for preventing the further spread of bed bugs.

- Determine if the infested home is being treated. Home remedies and do-it-yourself treatments are usually insufficient and could cause negative health effects or produce potential hazards in the home.
- If a parent lacks the financial resources to hire a pest management professional, they can contact the community's public health nurse and/or civic center.
- In an infested home, parents should store their child's freshly laundered clothing in sealed plastic bags until they are put on in the morning. This prevents bed bugs from hiding in the clothing and being carried to school.
- Backpacks, lunchboxes, and other items that travel back and forth to school can also be inspected daily and stored in sealed plastic containers at home to prevent bed bugs from getting into them.
- At school, the student could be provided with plastic bags or bins in which to store their belongings in order to prevent any bed bugs from spreading to other students' belongings.
- If bed bugs are finding their way into the school, consider notifying the affected classes. A sample notification letter is provided at the end of this document.
- Continue to use these measures until successful treatment of the home has been verified.

TREATMENT

Controlling bed bugs requires a significant investment of time and resources. **Bed bugs can be eliminated** with a coordinated effort that includes cooperation of the resident and pest management professional (PMP), or the resident, landlord/property manager, and PMP. There is no single tool or activity that, used alone, will eliminate bed bugs, including pesticides. Multiple techniques are always required because bed bugs are small, good at hiding, and can survive long periods of time without feeding. Despite the challenges, the technology of bed bug control is getting better and elimination of a bed bug infestation is achievable. The components of a sound treatment plan include:

- Education
- Reporting and Record Keeping
- Pre-treatment
- Treatment (both non-chemical and pesticides)
- Post-treatment Assessment

Isolating the Bed (To help reduce bites immediately)

A couple of simple steps can dramatically improve the quality of life for a resident in an infested apartment. These steps can help reduce bites from bed bugs while a treatment plan is initiated or is ongoing:

1. A thorough vacuuming of the apartment is recommended to reduce the number of bed bugs present, especially in the sleeping areas and around and under the bed.
2. Headboards and bed frames should be carefully inspected and cleaned of any signs of bed bugs or eggs. They are easily cleaned and scrubbed with standard household cleaning agents.
3. Encase the mattress and box spring to prevent bed bugs from reaching residents.
4. The bed should be moved away from the wall, bed skirts should be removed and bedding should be prevented from touching the floor to prevent bed bugs from climbing onto the bed.
5. Once it is thought that there are no bed bugs on the headboard, frame, and mattress, petroleum jelly or double-sided tape on the legs of the bed can prevent bed bugs from crawling up from the floor. Residents can also place a plastic dish with a thin layer of cooking oil below the legs of the bed to trap bed bugs as they try to climb to the bed. These techniques may be more difficult with platform-style beds.



Disposal of Infested Items

One way bed bugs are likely being transferred from place to place is through infested furniture and discarded objects. When a bed bug infestation is discovered, often the first step people take is to discard infested furniture and belongings. If infested items are discarded they should be wrapped in plastic before disposal and **LABELLED** as “**INFESTED WITH BED BUGS.**” It is also good practice to destroy or deface the infested items to prevent others from unknowingly collecting and reusing them. Slash mattresses and plush furniture, break box spring frames, and label items with the words “bed bugs” to prevent the spread of bed bugs in your community.

NON-CHEMICAL TREATMENTS TO ELIMINATE BED BUGS:

Steam treatment:

Steam treatments, when properly applied, will kill all life stages of bed bugs, including the eggs, which are protected from the effects of most pesticides. It is recommended that a facility at risk of getting bed bugs invest in a steam cleaner for fighting bed bugs. Combined with pesticides and other methods, steam is very effective and can be used to reduce allergens and dust mites. Steam can be used on mattresses and plush furniture, such as couches and chairs. However, steam will only kill bed bugs in places where the steam can reach. Contact time for heat is also critical. Move the steam cleaner nozzle slowly (20 seconds per linear foot) to maximize depth and time of exposure.

The best choice in a steam machine is a professional type with a large water-holding capacity, many types of attachments, and variable output rates. Dry-steam or low vapor steamers are better because they use and leave behind less moisture. Steam cleaning should be done before vacuuming because steam will flush bed bugs out of their hiding spots allowing them to be killed or vacuumed up. By reducing the number of live bed bugs vacuumed up, it also reduces the chance that the vacuum will become infested and spread bed bugs to new areas.

Thermal Remediation Using Ambient Heat (Convection Heat):

Heat treatments come in many forms from clothes dryers to heating units capable of treating an entire house. Heat has the advantage of killing all stages of the bed bugs lifecycle. Whole unit heat treatments usually use a series of heat generating equipment and fans to circulate super-heated air within a unit. This “convection heat” method of bed bug control has shown much promise. The entire unit is brought up to a temperature that does not harm most belongings, but is deadly to bed bugs and their eggs. In multiple-unit facilities, however, room/unit inspections must be done on adjacent units to prevent bed bugs from re-infesting the unit following heat treatment. Poulin Exterminators is one of two pest management companies that provide this service in Manitoba.

Freezing and the Use of Dry Ice or Liquid CO₂:

The use of cold temperatures or freezing is often recommended as a method to kill bed bugs; however its effectiveness can vary. It has been shown that some bed bugs can recover from being frozen if not subjected to temperatures low enough or for long enough. Studies have shown that freezing bed bug infested items at <0°F for two or more hours is effective. Using this method, it takes approximately 8 hours for 5 pounds of dry laundry to REACH 0°F. Many items, however, can not be treated with this method due to size or item type. A new rapid freeze technology called Cryonite™ has been developed. This method uses carbon dioxide snow to rapidly freeze and kill bed bugs. It is applied in much the same way that steam is used, primarily as a crack/crevice treatment. This technique leaves no pesticide residue.

Use of Pesticides:

Pesticides are an important tool in the fight against bed bugs. However, they should be applied by a licensed and well-trained pest management professional (PMP). People who apply pesticides for hire or as part of their employment must be certified or registered. Businesses that apply pesticides for hire must also have a business license. Use of pesticides alone will not eradicate a bed bug infestation. Pesticides are most effective when used in the context of an Integrated Pest Management program, as outlined above.

The types of pesticides that are commonly used for the control of bed bugs include:

- Liquid insecticide for treatment of moldings, carpet edges, cracks and crevices
- Aerosol insecticides for treating bed frames, box springs, furniture, cracks and crevices.
- Dusts (that may or may not include an insecticide compound) used in cracks and crevices, inside walls, behind electrical outlet covers and switch plates.
- Fumigants are gases used for treating whole buildings, or for container treatments of the contents of a home. Fumigants are different than foggers.

- Foggers, commonly called “bug bombs” are liquid aerosol insecticides that are released into the air of an indoor space. **They are not effective for bed bug control.** The use of these methods has also been linked to acute pesticide toxicity in people through misuse, insecticide resistance in bed bugs, and is suspected to promote the dispersal and potential spread of bed bugs through repellency.

For more detailed information on bed bugs see the full manual of Michigan’s Bed Bug Prevention & Control Manual.

Last Updated July 11, 2017

Bed Bugs: School Response Flowchart (Guideline)

