Michigan Manual for the Prevention and Control of Bed Bugs

Comprehensive guidance to identify, treat, manage and prevent bed bugs

Michigan Department of Community Health

MDCH

Presented by Michigan's Bed Bug Working Group

MICHIGAN MANUAL FOR THE PREVENTION AND CONTROL OF BED BUGS

Produced by the Michigan Department of Community Health and the Michigan Bed Bug Working Group

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INTRODUCTION

For the past several decades Michigan, the United States, 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 manual has been created as a guide and reference tool, and is specific to the laws and regulations of the State of Michigan. The target audiences are public agencies and private or public housing administrators and their facilities management teams. It is also applicable to homeowners and any other member of the public dealing with a bed bug infestation. The manual will cover bed bug biology, health concerns, and prevention and management of infestations in different types of living situations. Fact sheets listed at the end may be used and reproduced as "stand alone" educational documents for residents, housekeepers, medical and social service providers, and others as needed.

CORE MANUAL

Getting to Know the Bed Bug

Natural History

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 Michigan**. Bed bugs live where people live because they only feed on sleeping humans. Thus, in Michigan 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.

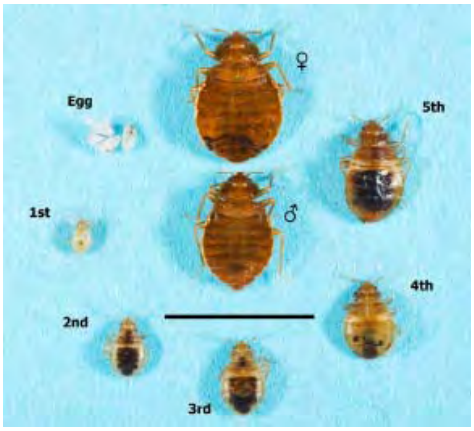
Biology

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, 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. See the Treatment section for details about the use of these bed bug control technologies.

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. See the Inspection section for how to inspect a hotel room for evidence of bed bugs

How Do You Know If Bed Bugs Are Biting?

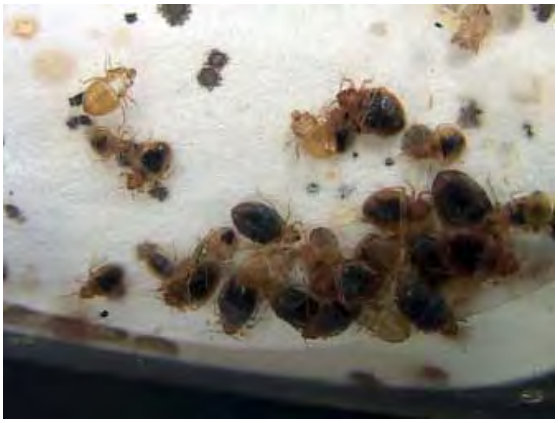
When bed bugs feed, they inject a small amount of saliva under the skin. Some people do not react to the bites. In others, the proteins in the saliva can stimulate an immune response, leading to red, itchy swelling at the sight of the bite. Some individuals become sensitized over time and repeated exposures, 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 (see the Inspection section for tips on how to inspect an area for bed bugs), then other biting pests or allergens must be considered (see Other Biting Arthropods section).

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. For more information, see the Laws and Regulations section.

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. Please see the Treatment section of this manual for a list of effective ways to combat bed bugs and prevent human feeding.

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**.

What Are Some Other Causes for Red, Itchy Swellings of the Skin?

- Contact with topical or systemic allergens may cause hives or lesions that look like “bites”. Changes in the use of detergents for laundering, or allergic reactions to materials in the environment can cause a range of skin reactions and must also be considered if no insect culprit can be identified. A **thorough medical evaluation** is required to rule out a **biological cause** for the symptoms such as allergic reaction or other skin infection.
- Bites from other insects can all have a similar appearance. These include mosquitoes, biting flies, fleas, ticks, mites such as scabies, and sucking lice (pediculosis). **If a person thinks they are suffering from repeated bites, it is essential to attempt to identify the offending creature either on or in the skin or in the person’s environment.**
- If a causative agent cannot be identified in a person who is convinced they are receiving insect bites, the person may be suffering from delusory parasitosis, a psychosomatic condition unrelated to an actual infestation with an insect or parasite.

Other Biting Arthropods

Other arthropods (insects and arachnids) can cause bites and lesions and it is often difficult to distinguish bed bug bites from those of other biting pests. Bite reactions may vary and factors such as bite location on the body, personal activities, time of year, and environmental conditions can help determine the cause.

If you or someone you know has bites, consider the following:

- Bed bugs tend to feed on exposed skin, but can feed under loose clothing.
- Bed bugs primarily feed at night in the dark.
- Bed bug bite reactions can take a few minutes to 14 days to appear.

- If evidence of bed bugs cannot be located in sleeping areas after multiple inspections, consider other biting pests.
- If local temperatures are over 60º F and the individual is outdoors or has windows or doors open, mosquito or “no-see-um” bites must be considered.
- Pets or wildlife may be a source of fleas and mites that can bite humans, especially in warmer months.

The following is a list of other potential culprits besides bed bugs:

Mosquitoes: Mosquitoes are normally encountered outdoors during the warmer months of spring and summer; however, damaged screens, open doors and windows will allow them to enter the living area. They generally feed at dusk or dawn, but some species will bite during the day. In most cases, skin reaction to the injected allergen from mosquitoes results in the appearance of an irregular blanched wheal, surrounded by an area of itchy redness. Mosquitoes can bite on any part of the body that is exposed and may bite through thin layers of clothing. Mosquitoes typically only bite once and bites will not normally be clustered or in a line, however multiple mosquitoes may bite during the same time period.

For more information about mosquitoes and their diseases in Michigan see Michigan’s Emerging Diseases website.

Head, body, and pubic lice: Unlike bed bugs, lice live on the human body, feeding by penetrating the skin. Head lice live in the hair on the scalp and lay their small, whitish eggs (nits) close to the base of hair follicles. Pubic lice usually live in the hairs of the pubic region, but can also infest the chest, armpit, and eyelashes. Body lice are not common in the U.S., but are unique because they lay their eggs in the seams and folds of clothing, and feed on adjacent skin.

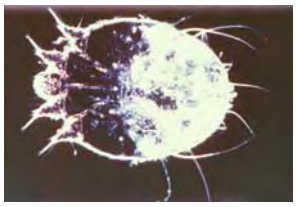
The most common symptom of head lice is itching of the scalp due to sensitization to allergens in lice saliva. Often there are no symptoms. Occasionally, scratching leads to chafing and secondary bacterial infection requiring treatment with an antibiotic.

Head lice outbreaks are common in elementary schools, child care facilities, and group living situations. Head lice do not transmit diseases, but are a "nuisance pest" and can be difficult and time consuming to eliminate. The Michigan Department of Community Health has published a Head Lice Manual that is available to schools, child care facilites, group living facilities and the public. This manual provides valuable prevention and control information, as well as recommendations for schools and other facilities.

Ticks: Ticks are most often present in natural areas such as grassy shorelines, wooded areas, or fields near wooded areas. Ticks are rarely encountered indoors unless pets bring them inside. Adult ticks have eight legs and are 1/8 to 5/8 inch long (smaller than a sunflower seed), and their colors can vary widely. Nymphal (immature) ticks are smaller, usually less than 2 millimeters. Ticks feed painlessly by attaching themselves to the skin with their piercing mouthparts. They can attach anywhere on the body, but are commonly found in the hairline, ears, waistline, armpit and groin. Unlike bed bugs, most ticks in Michigan must stay attached to their host for several days. In Michigan the most common ticks encountered by people are the American Dog tick, the Blacklegged tick, and increasingly the Lone Star tick. A description of the five most common ticks in Michigan can be found at www.michigan.gov/lymedisease. Some ticks, however, exhibit "bed bug-like" behavior, including stealthy night feeding, short feeding times, and harborage indoors. These ticks are uncommon in Michigan, but may be encountered in other parts of the U.S. (particularly in rustic mountain cabins), and internationally.

Fleas: Flea bites on people are normally associated with the presence of companion animals (dogs and cats) which are the flea's normal host. Fleas also infest wildlife and are most abundant outdoors in the late summer and fall. Fleas can be maintained indoors year round. The presence of fleas in a home or apartment will be the result of an infested pet, or the presence of rodents or other wildlife in wall voids, basements, crawl spaces or attics. Unlike bed bugs, fleas jump rather than crawl in the environment. Fleas prefer to bite animals, but will feed on people when their normal host is not readily available. They usually

bite exposed skin, especially around the ankles, and bites can appear in clusters or lines of two. Flea bites typically appear as red spots or raised, itchy lesions and may be confused with bed bug bites.



Mites: Mites are very small arthropods related to spiders and ticks. Several species are associated with humans, pets, domesticated foul, and rodents. The human scabies mite can cause irritation via feeding and burrowing into the skin. Typically, the organisms are found in skin folds and any associated skin damage is typically distinct from the pinprick lesions associated with bed bug bites. The Michigan Department of Community Health has published a Scabies Manual that is available to schools, child care facilities, group living facilities and the public. Other mites, such as species normally found on bird or rodent hosts, can bite humans if their primary host vacates the nest. These organisms will bite day or night and their bites can be felt, in contrast to most bed bugs. Rodent or bird nests in or on a human dwelling are usually the source of these infestations.

Spiders: Spiders rarely bite people unless they are disturbed in their environment or while moving through the environment. Many bites occur when people are reaching for items in closets, basements, or other places where items are stored; or when sleeping people roll onto spiders by accident. Spiders have paired mouthparts and venom glands. Many spiders' mouthparts are too small to puncture skin, but others can leave a painful or itchy bite. All spiders are venomous, but those dangerous to humans are rare in Michigan (black widow is native, brown recluse is not). Necrotic skin infections associated with *Staphylococus* bacteria are often mistaken for brown recluse spider bites. The yellow sac spider, often found in human dwellings in Michigan, can also give a painful bite than causes localized skin necrosis but any spider bite is usually quite different from bite marks left by bed bugs.

Responsible and Safe Use of Pesticides for Bed Bugs

Pesticides are chemicals designed to repel or kill a wide range of animal and insect pests. **All pesticides are potentially harmful to people and other animals.** Pesticides are registered at the federal and state level, and MUST contain a label that outlines how and where they are to be used. Also, the label will contain information about which type of pest it is meant to control. It is a violation of federal and state laws to use a pesticide in any way other than as the label directs. It is important to FOLLOW THE LABEL DIRECTIONS including the use of appropriate personal protective equipment that may be required to protect the health of the applicator. Strict adherence to the label will protect both individuals in the treatment location and the environment. Before deciding to use pesticides to treat a bed bug infestation, consider the following:

- Pesticide application IS normally required to effectively eradicate a bed bug infestation. Other non-chemical methods such as heat (dry or steam) can be effective. Often, multiple methods will be used in combination as bed bug infestations are difficult to control.
- It may be possible to minimize pesticide applications with thorough and repeated cleaning, and removal or repair of hiding places. See the Treatment section to learn how to clean and repair a residence/facility and get rid of hiding spaces.
- Pesticide application by a licensed pest management company with experience treating bed bugs is recommended, as they have the training to use pesticides safely and effectively.
- Michigan's Bed Bug Resource website has links to find pest control businesses licensed in Michigan and tips on choosing the right pest management company. See www.michigan.gov/bedbugs.
- Some pesticides may only be applied by a licensed pesticide applicator. If you choose to apply pesticides yourself, READ AND FOLLOW THE LABEL CAREFULLY.
- Do not use a pesticide if the label does not specifically say it is for use on bed bugs.
- Do not apply any insecticide or pesticide to mattresses or to surfaces that would be in direct contact with a person, unless the label instructions specifically say to do so.
- Do not use a pesticide indoors, if it is only labeled for outdoor use.

- **Do not use 'bug bombs' or total release foggers to treat for bed bugs**. They put people and pets at risk, but do not get rid of the bed bugs. These devices release insecticides in small droplets which fall on surfaces, but do not get into the cracks and crevices where bed bugs live. The use of these products has been linked to acute pesticide toxicity in people and pets through misuse.
- Only use legal pesticides, with an EPA registration number on the label. Illegal and home-made pesticides may be dangerous, ineffective, or both.
- Be careful when using flammable pesticides, especially if you smoke.
- Clean and vacuum before any pesticide application, so the pesticide can more easily get into the bed bug hiding places.
- Use caution with bleach or ammonia. The vapors can be harmful. NEVER mix bleach and ammonia.

BUG BOMBS: Fogger or "bug bomb" products may have labels that are misleading. The label may clearly say Bedbug Fogger, but these products are not effective in reaching the crevices and hiding spots that bed bugs harbor in. These products are often over-used because of difficulty in calculating the total cubic feet of the space to be treated, or because of a lack of effectiveness ("more is better"). Overuse of these products may cause mild to severe illness.

Laws and Regulations

Michigan law does not explicitly mention "bed bugs". However, laws that authorize the government to protect the public against vermin, rodents and insects, or nuisances or conditions detrimental to human health, also apply to protect the public against bed bugs. Additionally, individuals might have private causes of action (i.e. right to sue) if they suffer harm from bed bugs; for example, if they are sold infested mattresses or other goods, or their landlord fails to address a bed bug infestation.

Regulatory Authority of Health Officers

Local health departments have broad authority to protect the public health. Their authority includes investigation and control of environmental health hazards and nuisances within their jurisdiction. Their powers cover all situations that present a public health threat. Local health departments can provide consultation regarding bed bug control, and are authorized to take legal action at their discretion. For a directory of local health departments, and contact information, see the Michigan Association for Local Public Health website.

Regulatory Authority for Housing

Michigan's housing law covers most dwellings used for living or sleeping. Such dwellings include residences, rental housing, rooming houses, and hotels and motels. Owners are responsible for keeping the entire building free from vermin. Tenants are responsible for the cleanliness of those parts of the premises that they occupy and control. Thus, from a legal perspective, as well as a practical standpoint, it is essential that landlords and tenants work together to eliminate bed bugs.

The housing law authorizes officials to inspect premises, require compliance, and take action against an owner or occupant where conditions are a "public nuisance" or detrimental to the health of the occupants. Complaints involving dwellings where children reside are to be given

priority. Generally, this law is implemented by local code enforcement officials. Additionally, units of government can adopt and enforce their own local codes that set higher standards. Contact information for code enforcement can be found on city or township websites, through the Michigan Association of Housing Officials, or the government section of the telephone book. The housing law also authorizes owners or occupants of premises to bring a court action to enforce the law and to abate or enjoin a violation.

The "power of the purse strings" may be available to address a bed bug infestation where the government subsidizes housing under programs for low income residents.

State Subsidized Housing

The Michigan Department of Human Services (DHS) provides subsidies to rent or purchase a dwelling for recipients under the Family Independence Program (FIP) and the State Disability Assistance (SDA) Program. DHS may pay rent to landlords directly under a vendor agreement. The Housing Law of Michigan requires that housing officials notify DHS of hazards to the health or safety of occupants so that DHS can check the address of the premises against the list of rent-vendored DHS program recipients. DHS policy provides for denial or termination of a vendor agreement where a dwelling fails to meet the housing code or the landlord has failed to cooperate with housing code policies.

Federal Subsidized Housing

Additionally, the Michigan State Housing Development Authority (MSHDA), as contract administrator for the United States Department of Housing and Urban Development (HUD), subsidizes the housing expenses of thousands of Michigan residents under the federal Section 8 Housing Choice Voucher program (Section 8 Program). Federal regulations governing the Section 8 Program require that all assisted units comply with Housing Quality Standards (HQS), which HUD developed for nationwide use as a "floor level" unit standard of acceptability. The intent of HQS is to establish minimum criteria necessary for decent, healthy, safe and sanitary housing that is in good repair. MSHDA's responsibilities are to ensure that assisted units meet all HQS standards by performing a pre-move in and annual unit inspection. Incorporated in MSHDA's unit inspection is verification that evidence of infestation is not apparent. The purpose of this test is to ensure that the tenant will not be exposed to vermin, including bedbugs, which would threaten the general health and safety of the tenant.

In order to comply with Section 8 program requirements, tenants are responsible for maintaining the unit at all times and must cooperate with MSHDA inspections. Federal regulations require MSHDA to hold tenants accountable for tenant caused HQS violations. If it is determined that a tenant caused the HQS violation, rental assistance may be terminated. Owners must also respond promptly to tenant requests in addressing any infestation concern. The prescribed time frame for owners to make required repairs is 30 days. If the owner fails to make the required repairs within the aforementioned time period, such failure may lead to abatement of Housing Assistance Payments (HAP) and/or termination of the HAP contract.

Specialized housing and care environments

In addition to laws that apply to dwellings in general, Michigan regulates many residences and facilities that provide health, personal, or residential care. These include nursing homes, hospice residences, hospitals, adult foster care, homes for the aged, child foster care, and child residential centers. Additionally, Michigan regulates agricultural labor camps, campgrounds, child care facilities, and many other types of housing or businesses that could harbor bed bugs. To operate these businesses, the owner must meet minimum standards to obtain a license. Such standards require that the premise be free from insects, vermin, and rodents, and prohibit conditions that are detrimental to human health. Appendix A lists housing, facilities, and businesses that are licensed and regulatory authorities that are responsible for enforcing licensing standards.

Specifically, the Bureau of Children and Adult Licensing (BCAL) in the Department of Human Services has regulatory authority over children's camps, child care facilities, child foster care homes, child caring institutions, homes for the aged and adult foster care homes. Anyone, such as a resident of an adult foster care home, parent of a child in child care, etc., can make a complaint to BCAL regarding a BCAL registered or licensed facility. All complaints on any of the above facilities can be directed to BCAL, 866-856-0126 or online.

The complaint will be reviewed to determine if there are allegations of rule or statute violations. If so, the complaint will be assigned for investigation. A licensing consultant will complete a special investigation. If the special investigation results in a finding that the rules or statute was violated, a corrective action plan (CAP) will be developed. The CAP will indicate how the provider will correct the rule or statute violations. If the provider does not correct the violations as indicated in the CAP or continues to violate rules and the statute, the licensing consultant

may recommend that a provider's registration/license be revoked. There is a separate process to revoke a provider's license. More information about registered/licensed programs can be found on the BCAL Web site.

Similarly, the Michigan Department of Community Health (MDCH) regulates certain health facilities and agencies either because they must be licensed, or because they participate in Medicaid or Medicare, or both. MDCH's Bureau of Health Systems receives and processes consumer complaints against nursing homes, county medical care facilities, home health agencies, hospices, hospitals, freestanding surgical units, ambulatory surgical units, end-stage renal dialysis centers, rural health clinics, and psychiatric hospitals or units. Complaints may be made by telephone, mail, or online. More information about health facilities and agencies that are regulated by MDCH, and how to file a complaint, can be found on MDCH's website.

Protections for Consumers

Sale of Used Goods

A purchaser of infested goods may be able to seek redress under the Michigan Consumer Protection Act (MCPA). Consumers who bring successful actions under the MCPA may recover actual damages and attorneys fees. Consumers may also file a complaint with the Department of the Attorney General. Also, local prosecutors may enforce the MCPA in the same manner as the Office of Attorney General. The Consumer Protection Division of the Attorney General's office may attempt to mediate resolution of a complaint. However, in the event the business does not cooperate, the Attorney General's office does not serve as an attorney for individual consumers.

Used or "Second Hand" Mattresses

Currently, there is no specific prohibition in state law on the sale of used mattresses. However, the seller would need to determine whether there are any applicable local ordinances or local health regulations. It is essential that a seller take precautions to ensure that a used mattress is sanitary

and free from bed bugs and any other infestations. Selling an infested mattress poses a public health hazard, in violation of the Public Health Code. Any person who sells such goods may be subject to legal action. In addition, if a seller failed to disclose that the mattress was previously used, or the seller disclosed that the mattress had been used before, but failed to disclose that the mattress had not been treated for pests before the sale, the seller may have violated the Michigan Consumer Protection Act, MCL 445.903(s).

Consumers may also bring actions under the Uniform Commercial Code (UCC) if a seller sells a used mattress or furniture to an end-user consumer without disclosing that: 1) the furniture was used; 2) the furniture had not been sanitized; or 3) the furniture was infested at the time of sale. A common law civil fraud claim may also be possible. The consumer would need to seek the advice of an attorney to determine if they could bring an action against the seller for violations of any one of the above-referenced laws. If a seller has questions about whether they are selling an item of furniture in compliance with all relevant laws, they may wish to seek the advice of a private attorney as well.

Finally, it is important for consumers to educate themselves on the risks of purchasing used items (furniture, clothing, etc.). Items should be inspected for bed bugs prior to purchase or before bringing them home. See the Inspection section within the Treatment Guidelines for tips on how to inspect your items.

Consumer Protections in Real Estate

The Seller Disclosure Act may provide some protection to purchasers of housing. This act applies to the transfer of any interest in real estate consisting of not less than 1 or more than 4 residential dwelling units, whether by sale, exchange, installment land contract, lease with an option to purchase, any other option to purchase, or ground lease coupled with proposed improvements by the purchaser or tenant, or a transfer of stock or an interest in a residential cooperative. This act requires that the seller provide a written disclosure of the condition and information concerning the property, known by the seller, prior to execution of a purchase agreement, including a history of infestation, if any. In the event the seller fails to disclose a known condition, the purchaser should seek the advice of legal counsel regarding potential remedies.

Authority of the Michigan Department of Agriculture to Regulate Pesticides

Michigan laws pertaining to pesticide sales and pesticide use are in place to ensure the protection of people, animals and the environment. Pesticides include substances that are intended for preventing, destroying, repelling, or mitigating pests. All pesticides must be registered for sale with the Michigan Department of Agriculture (MDA), must be sold or distributed with full labeled directions, and must be packaged in unbroken containers. All pesticide users are responsible for applying pesticides according to the labeled use directions which are listed on the packaging. MDA has the authority to take enforcement action when a pesticide is not applied according to labeled directions, or is "misused."

Commercial applicators, which are people applying pesticides in the course of their employment, must be certified with the MDA before applying pesticides. A business engaged in applying pesticides for hire must also have a business license with the MDA and must follow other requirements when applying, storing, or transporting pesticides. MDA also oversees laws that require the public to be notified when pesticide applications are made in child care facilities, schools, and public buildings.

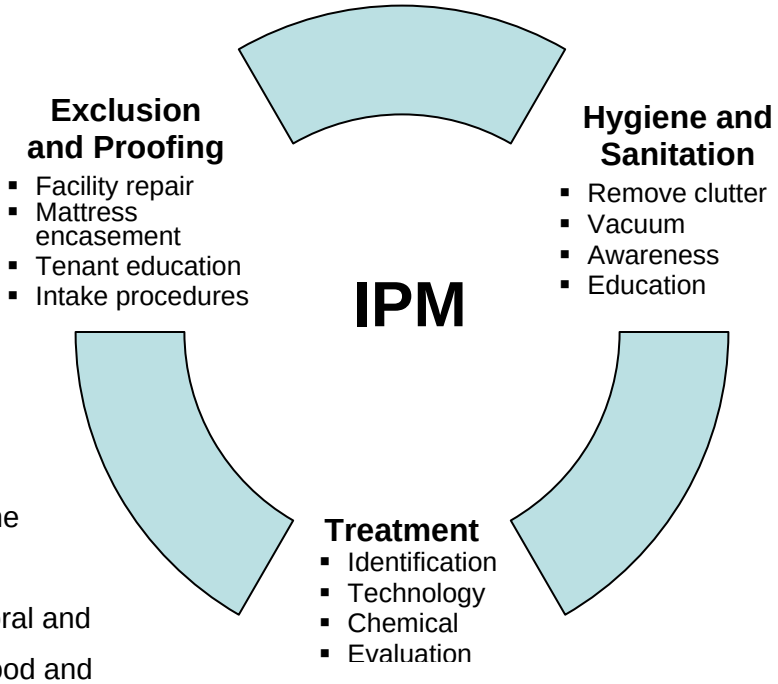
For further information about pesticide laws in Michigan, to check the license status of a business, or to file a pesticide misuse complaint you may contact MDA at 1-800-292-3939 or visit the MDA website www.michigan.gov/mda.

For further information about pesticides and pesticide use you may contact the National Pesticide Information Center at 1-800-858-7378 or visit their website www.npic.orst.edu.

Bed Bug Treatment Guidelines

The Integrated Pest Management Philosophy

Integrated pest management (IPM) is a philosophy that uses all possible control methods in a logical combination to minimize risk of pesticide exposure, safeguard the environment, and maximize effectiveness. An IPM program focuses first on environmental management to reduce pest populations by eradicating their harborage and food source. Pesticide use is minimized. When pesticides must be used, the least harmful chemical for the environment and the people living in it is chosen. The main steps in an IPM program include:



1. Define your objective - in this instance, it is the eradication of bed bugs.
2. Inspection – carefully inspect the environment to determine if pests are present.
3. Identification – confirm the identification of the pest you want to control. This is an important step, because your treatment regimen will be based on the pest's life-cycle and behavior.
4. Treatment – this may include behavioral and environmental modifications to limit food and harborage to the pest. In other instances this includes the use of pesticides and other means of killing the target pest.
5. Evaluation of treatment – this step looks at the effectiveness of your treatment and allows for the modification of the IPM plan to better control the pest. It may include re-treatment if necessary.

IPM programs also include prevention through education of clients, residents, facility managers, and landlords.

IPM for Bed Bugs

The objective of bed bug control is complete eradication. Due to their very nature as tiny, nocturnal insects prone to hiding, **bed bug control operations are difficult and painstaking.** With the exception of whole-house/unit treatments, such as fumigation and thermal remediation (convection heat), it is necessary to find and treat every hiding place. Techniques available to the non-professional require careful work and attention to detail.

Current best practices in bed bug control are changing at a rapid rate. The operations discussed here represent the state of bed bug management at the time of writing or revision. New materials and techniques are continually becoming available for use against bed bugs and, if successful, may radically change the nature of bed bug management.

Different types of buildings and facilities will necessarily adopt different bed bug management strategies. Health care facilities that serve a continually changing roster of patients will need to focus on prevention, while an apartment community will probably focus on discovery and tenant cooperation. Be sure to adapt your program to fit the individual character of the facility you are serving whether it is a home, multi-unit housing, or other facility.

Strategies that DO NOT work:

Abandoning rooms, apartments, or whole facilities will not guarantee that bed bugs will be eradicated. Adult bed bugs can live without a blood meal for long periods of time and will wander to find a new host.

The use of "bug bombs" or total release foggers is not advised. While some of these products may be labeled for use against bed bugs, this delivery method is unlikely to control a bed bug infestation and can be very dangerous if applied incorrectly.

Discarding beds and bedding will not rid your home of bed bugs completely. Bed bugs may also be hiding in other places. New mattresses, if not protected, will become infested as well. Whether you decide to keep or to replace your old mattress, it is recommended that you seal the mattress AND box spring in a high-quality bed bug-proof vinyl plastic or fabric encasement.

Inspection

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 and 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.

<u>What to look for</u>

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**

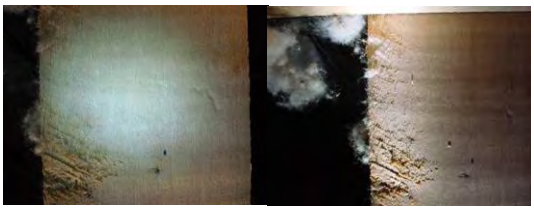
  Although they are only about 1 mm long, bed bug eggs are white and will show up well in a number of situations. They are more visible on dark backgrounds or smooth surfaces. Females have a tendency to lay eggs around their harborage areas. A cluster of eggs is a pretty good indication that there is a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

<u>How to look</u>

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.

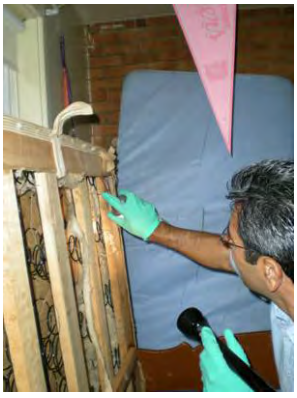
Inspecting the bed

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 holes for bed bugs.
- Take the bed apart to check between parts.
- 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.

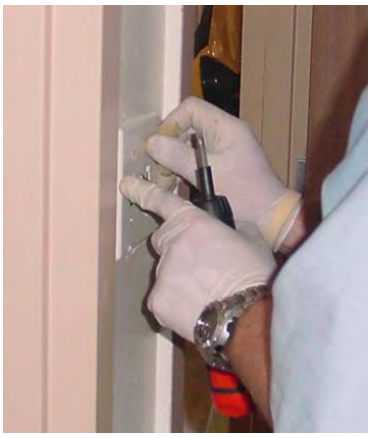
- Inspect pillows and cushions, particularly the seams and the folds around zippers.
- Look at, and under legs of chairs and couches.
- Turn over the furniture and remove the thin cloth backing under each piece.
- Pay special attention to staples and where material is stapled to the frame.
- Look inside 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.

Bed bug detecting dogs

Several companies in Michigan offer bed bug detection using dogs, specifically trained for locating bed bugs. The dogs are a highly efficient and sensitive tool, and can be especially useful in multi-unit housing situations. However, like any inspection tool, they are not 100% accurate. Combining the services of a bed bug detection dog with a licensed pest management professional can improve the chances of finding and eliminating obscure harborages. A 2-dog system is sometimes used to reduce the problem of “false positives”. When the dog signals for bed bugs, a pest management technician should be present to confirm and later treat the area. Dogs can positively indicate a bed bug problem, but it is unclear whether using a bed bug dog can absolutely rule out bed bugs (for example, if bed bugs are hiding in an area inaccessible to the dog). The dog handler team should be recognized by a certifying organization, such as the National Entomology Scent Detection Canine Association.

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 Michigan through Michigan State University Diagnostic Services.

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

Educating Residents and Staff

The administrators and facilities managers of apartment buildings, group homes, dormitories, homeless shelters, and other types of housing should seek to better educate residents about bed bugs and how to prevent them. The Michigan Bed Bug Working Group offers fact sheets on bed bugs to educate the public. These fact sheets are available at www.michigan.gov/bedbugs. In addition, non-profit associations such as the Michigan Pest Management Association and/or its member firms offer bed bug training programs. This manual also contains fact sheets for resident education in the Appendices section.

Reporting and Recordkeeping

It is critical for managers of multiple-unit housing of any type to encourage residents to report suspected cases of bed bugs to the facility manager. If a bed bug problem is not addressed immediately, it will grow quickly and spread throughout the facility room by room. Eliminating a widespread problem is MUCH more expensive and difficult than a limited one.

Bed bugs and other pests sometimes elicit fear and panic in people. Most are unwilling to live with pests, especially those that bite. However, some individuals are resigned to living with bed bugs and may be the source of an infestation in an adjacent unit or room. **Encourage residents to speak openly about bed bugs** and other pests and to ask for help. Be sensitive to their concerns. Complaints about pests or bites must be handled IMMEDIATELY, but also with a logical approach that relies on science and pest control expertise.

Designation of a pest management coordinator in your organization can streamline the handling of complaints and infestations. The typical course of events would be receipt of a complaint, inspection (of one or many units), confirmation, cleaning, treatment, future prevention, and follow up to be sure the problem was handled adequately. There should be one person in charge of overseeing the inspection and treatment process. Often this is the building or facility manager. Use resources available to you, and gather the contact information of experts, such as your pest control company's staff entomologist, to ensure a quick response.

Management should keep records of the following for all types of pests:

- Date of the complaint
- Type of complaint (bites, bug sightings, damage to property)
- Unit or room number
- Date of first pest inspection
- Results of the inspection, what was found, how much was found
- Dates of pest management activities
- What pest management strategies were used, such as cleaning, pesticide treatments, resident education

Recordkeeping Requirements for Licensed Pest Management Firms and Certified Commercial Pesticide Applicators in Michigan

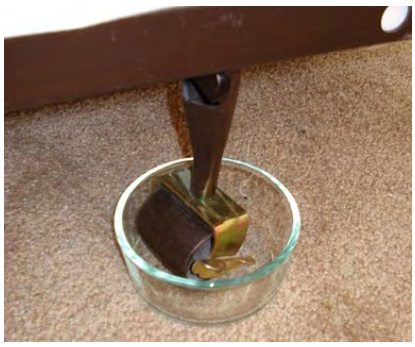
The recordkeeping requirements for licensed pest management businesses and certified commercial pesticide applicators are outlined in State of Michigan regulations and are available in Appendix H of this manual.

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.



Pre-Treatment Preparations

Preparation of a living area for bed bug elimination should focus on containment of the infestation through cleaning, organizing, repairs, and physical barriers. Do everything possible to avoid spreading bed bugs to new locations.

A combination of the following steps will be needed for bed bug control:

- Clean and organize the bed, bedroom, other living areas, furniture and belongings, focusing on the elimination of clutter.
- Physically remove bed bugs and eggs using a vacuum.
- Isolate the bed (see above), using barriers, such as mattress encasements and sticky barriers (sticky traps may be useful for monitoring but will not help control bed bugs).
- Eliminate bed bug hiding spots
    - Fix peeling wallpaper or paint
    - Caulk or seal cracks and crevices around the room and on furniture
    - Seal floors or the spaces between floor boards or tiles
    - Make other repairs to the living area to reduce hiding spots
- Employ professional pest management that uses a combination of chemical and non-chemical methods to eliminate a bed bug infestation.

It is important to consider that a bed bug infestation in a living area (bedroom, apartment, dormitory room, shelter room or unit) might spread to adjacent units or those below, above or to the sides. This is especially true if the population is high or if pesticides are used in the original unit. Adjacent units should be inspected and if bed bugs are found or residents report bites, they should be treated as if infested and the above measures should be applied.

Cleaning and organizing a room or home

Cleaning and organizing a room or home for bed bug management can be as burdensome as changing residences. It is, however, an extremely important first step to control bed bugs, because bed bugs will thrive in a cluttered living area. Vacuuming and cleaning should be done before chemical or non-chemical treatment. Cleaning should be carried out in a systematic way, beginning with removing items from the infested room or home. Soap or detergent will aid

WARNING! When chlorine bleach is mixed with acid or ammonia, it produces toxic gases that can harm you.

You can't always tell if a cleaning product contains bleach, acid, or ammonia, so for safety's sake, never mix cleaning products together!

in the clean up of bed bug debris and allergens, making the environment healthier and more tolerable for those living there. Bleach and ammonia may kill bed bugs if sprayed directly on them, but their vapors can also be harmful- USE CAUTION, and **NEVER mix bleach and ammonia!**

Steps to follow include (preparation for heat treatment may involve different steps):

- Scan the room for items on the floor. Make a plan for each item, and how it will be quarantined (closed into a plastic bag, for example), inspected, sanitized of bed bugs, and stored until further notice.
- Place clothes, shoes, plush toys, pillows, and bedding into large clear plastic bags and seal them tightly to be laundered.
- Empty furniture items for better inspection
- Plastic tote bins that have an airtight seal can be used for items that cannot be laundered, such as hard toys, electronics, books, breakable items, etc. Be prepared to store these items for a period of time until they can be thoroughly inspected or enough time has passed that bed bugs are dead – at least a year. Another method is to have these items treated in the container, consult a PMP for guidance.
- Launder all clothing and bedding (it is recommended to use the highest heat settings for washing and drying if possible)
- Move furniture away from walls

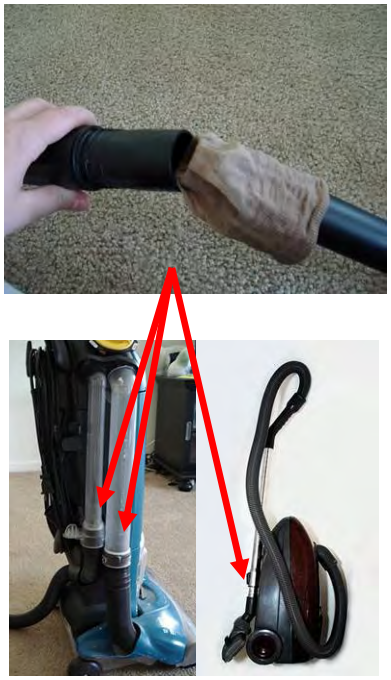
In places such as shelters, long term care facilities, institutional child care centers, and camps, cleaning teams or the facility management may be responsible for the majority of housekeeping duties. Cleaning for bed bugs should focus on sleeping and lounging areas (whereas cockroach control depends on sanitation in cooking and eating areas). However, for cleaning to have any impact, the resident must cooperate by reducing clutter, organizing, and bagging their belongings. There may be a need to store their belongings temporarily. Be certain every item is bagged until it can be cleaned of bed bugs. Units should always be cleaned and inspected before new tenants move in.

Vacuuming

A cleaning procedure for bed bugs begins with vacuuming, using a HEPA-equipped vacuum that is dedicated only to pest control. Although a regular vacuum is acceptable, a HEPA-equipped vacuum will reduce the spread of allergens. A crevice tool will be needed to focus suction in small spaces, cracks and crevices. A brush attachment can also be used but must be cleaned carefully to prevent the spread of bed bugs. See below for proper handling of the vacuum cleaner and vacuum bags:

Handling a bed bug vacuum

A vacuum used for bed bugs can have live bed bugs inside and it will be important to avoid transferring bed bugs to new locations.



- **Dedicate a vacuum for the purpose of pest control in multi-unit housing facilities**
- If used only for pest control, after each use, remove the vacuum bag or container and dispose of the bag or container contents in a sealed plastic bag.
- NOTE: A knee-high stocking can be placed on the hose of the vacuum prior to the bag or container. The knee-high stocking will capture bed bugs and larger particulates before they reach the bag. If this technique is used, it may not be necessary to replace the vacuum bag after each use. However, the knee-high stockings should be replaced between each use, sealed in a plastic bag, and discarded.
- Clean the brush attachment with hot water and detergent.
- Store the pest control vacuum in a large plastic garbage bag that is closed tightly.
- Inspect the vacuum before each use to be sure no live bed bugs are on the outside.

Vacuuming procedure

- Once the room has been “stripped” of all personal belongings, begin vacuuming the bed, paying special attention to the mattress seams.
- Use a brush or crevice attachment with a scraping motion to dislodge bed bugs or eggs.
- Remove the mattress and box spring from the bed frame and inspect and vacuum all surfaces, removing all loose debris and visible bed bugs.
- Flip the bed frame over and vacuum any crevices where bed bugs may hide. This is especially important for wooden bed frames and captain’s beds.
- Vacuum inside and under drawers of night stands, dressers, and other furniture.
- Turn over each piece of furniture and vacuum the under side of each.
- Pay attention to screw and nail holes.
- Vacuum along the bottoms of all walls and the moldings. If molding or wallpaper is loose, lift or remove and vacuum underneath.
- Make sure to vacuum around heating units.
- Vacuum along carpet edges.
- Vacuum plush furniture with a carpet-beater attachment or by patting the furniture while vacuuming to flush out bed bugs.
- If a vacuum brush attachment is used it is possible some live bugs or eggs could be caught in the brush bristles. Wash the vacuum brush with hot water and detergent if this is a concern.

Washing Surfaces and Furniture

- Wash all furniture (non-plush) and hard surfaces in the room using a detergent cleanser. Pay attention to crevices and spaces in the frame.
- After removing the mattress and box spring from the bed frame, wash the bed frame liberally with soap and water.
- Wash cribs and children’s bed frames with soap and water rather than using pesticides.
- Wash the floors, moldings, window sills, and walls generously.
- Steam can be used as well. **Do not use liquids or steam on electrical wiring or equipment.**

Rugs and Carpeting

- Many small rugs can be placed into the dryer on a hot setting for 30 minutes.
- If the room has a large area rug, the rug can be steam cleaned within the same time frame that other bed bug control measures are taking place, although steaming should be done before pesticide applications are made. Rugs can be sent out for professional cleaning as well. Wrap in plastic for transport and advise the cleaning company that bed bugs may be present.
- Wall to wall carpeting can harbor bed bugs and should be removed, especially in a heavy infestation, or steam cleaned, paying very close attention to the edges. Prior inspection will help determine where to concentrate steaming efforts. Carpeting may also be treated with a labeled pesticide.
- If carpet is removed or replaced, attention should be paid to the carpet tack strips as they can provide harborage for bed bugs.

Mattress Encasements

Mattress encasements are zippered enclosures that cover the entire mattress. Encasing both mattress and box spring eliminates the need to discard bedding by trapping bed bugs inside and providing a smooth simple outer surface that can be inspected, vacuumed and cleaned easily. Encasements should always be used for non-vinyl mattresses and box springs for bed bug prevention and management. Special bed bug-proof encasements are made of high quality cloth material that does not tear easily and has no folds around the zipper that might shelter bed bugs. Cheaper vinyl encasements are available but need to be installed carefully to avoid tears. If a small hole appears, duct tape can be used to repair it. Holes MUST be repaired to prevent bed bugs from either gaining protection on the inside of the cover, or to prevent bed bugs from escaping from the infested bedding. **It is highly recommended that both mattresses and box springs be encased, to protect the sleeping area and to make bed bug inspections quick and easy.**

Physical repairs

Simple structural repairs are important in containing infestations, eliminating bed bug harborage, and preventing re-infestation.

- Moldings and joints around the room perimeter (floor, doors, cabinets, and windows) should be caulked with silicone sealant to eliminate hiding spots for bed bugs.
- Wall outlets should be inspected and repaired to minimize gaps.
- Openings around pipes or other structures that come through walls, floors and ceilings must be sealed to prevent bed bug movement to/from adjacent units.
- Peeling wallpaper should be repaired or removed.
- Cracks in walls or floors should be repaired.

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 LABELED 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.

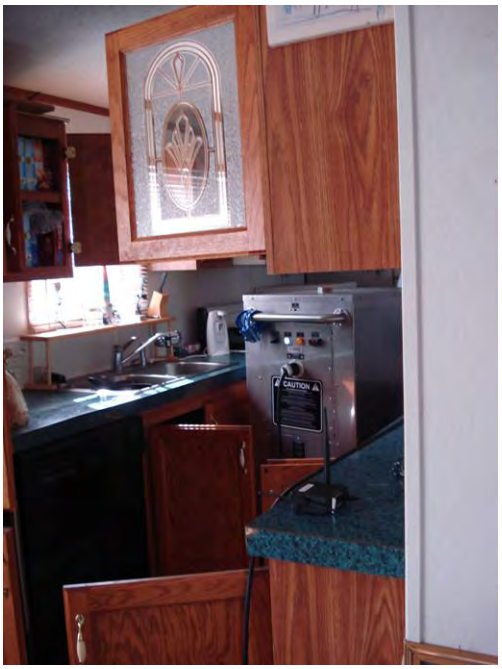
Non-Chemical Treatments to Eliminate Bed Bugs

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. Details of the use of steam for controlling bed bugs can be found in the book "*Bed Bug Handbook*" (Pinto, Cooper and Kraft, 2008). See the References section for more information.

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. In Michigan, whole unit thermal remediation using ambient heat, and compartment heat treatments are becoming more widely available. 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.

Freezing and the Use of Dry Ice or Liquid CO_2

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. This system is available in Michigan.

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). In Michigan, people who apply pesticides for hire or as part of their employment must be certified or registered by the Michigan Department of Agriculture (MDA). 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.

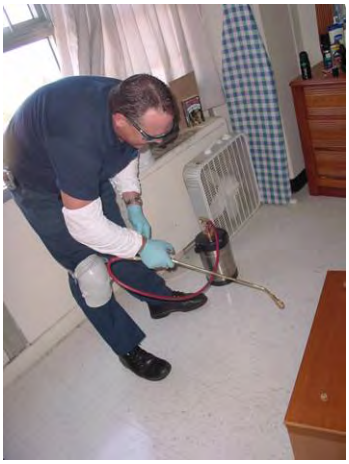
Pesticides available for sale in Michigan should be registered with the Michigan Department of Agriculture. There are many over-the-counter products readily available to the public. Pesticides must be approved for use against the pest listed on the label, and contain clear instructions on how the product can be used. People may also obtain remedies from the internet, many of which are not safe, effective or legal.

Residents of multi-unit housing should not attempt to do their own pest control. Local ordinances may prohibit the application of pesicides by tenants in government housing. Pesticide applications made by residents could impede the effectiveness of the building's bed bug treatment program and cause bed beds to become resistant to pesticides. Residents should contact their building management to report pest problems and should be reminded to follow the guidelines for cleaning and room preparation.

Incorrect use of pesticides for bed bugs poses several risks:

- Over-application of, or overexposure to pesticides can cause serious health effects or exacerbate existing conditions.
- Children are more susceptible to toxic effects of pesticides than adults.
- People tend to treat places where they see bed bugs, including the bed, which may result in pesticide overexposure.
- Unskilled use of pesticides can result in the spread of bed bugs into adjacent rooms and units.
- Bed bugs are developing resistance to pesticides used against them.
- **It is illegal.**

When bed bugs appear in a home, multi-unit housing facility, or communal living facility, it is best to hire a pest management professional and work closely with them to manage bed bugs safely and effectively. The PMP will conduct an inspection to confirm and locate bed bugs. They will then make recommendations for preparing the home/room/unit for treatment. Cleaning should be performed before pesticide treatment.



Only a few types of pesticides are available for use against bed bugs. Thoroughly read and follow the labeled directions of the pesticide and ensure that the site of application (mattress, apartment, bedroom, etc.) is listed on the label. Pesticides come in different formulations (liquid, aerosol, dust) but many have the same mode of action. Some low-risk products are available. Consult a PMP for information about treatment choices. 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.

What to Look for When Hiring a Pest Management Professional

- The pest management company must be **licensed by the state** and insured. A list of currently licensed pest management companies in Michigan is available at www.michigan.gov/bedbugs.
- Technicians must be either certified or registered pesticide applicators in general pest management (Category 7A) with the MDA. Technicians are issued a credential by MDA and should be able to display this credential upon request.
- The company should be a member of a professional organization, such as the National Pest Management Association, or the Michigan Pest Management Association.
- The company should have a staff entomologist or access to one.
- Technicians should have experience with bed bug management.
- Choose a company based on their quality of service, not the price. Get several proposals for service if possible and compare them.
- A pre-inspection should be conducted to assess the scope of the work.
- The proposed work should follow the steps of **Integrated Pest Management**, not just pesticide application.
- Technicians should be straightforward and open when discussing details of their service.
- Understand what guarantees are being offered. Bed bug management may be difficult to guarantee, because re-infestation from an outside source is possible.
- A licensed pest management firm is required to provide you with the information listed in Appendix H, under Regulation 637, Rule 12.

Post-Treatment Evaluation

Bed bug management is a time consuming and difficult task. To rid a household of bed bugs in a timely manner it is important to evaluate the effectiveness of the treatment methods being used and adjust to the best strategy. After physical repairs, cleaning, and treatment have been conducted it is important to monitor for surviving bed bugs. Whether using conventional, heat, or a combination of methods, there may be surviving eggs that will hatch. This does not mean the treatment is ineffective. As these eggs hatch it will be necessary for continued monitoring and follow-up treatments. Expect the treatment to progress over several weeks. Monitors

(sticky traps, bed bug interceptors) are useful in these situations. If a significant reduction in bed bugs is not observed after the first treatment, it may be necessary to consider a combination of methods or an alternative to the one being used. Reasons for treatment ineffectiveness may be:

- All sources of bed bugs were not identified during the inspection phase
- All sources of bed bugs were not treated. Consider re-inspecting adjacent units (they should be inspected prior to treatment)
- Ineffective insecticides, or insufficient contact time by heat methods
- Re-introduction by infested items – Do not move items out of the home or area to be treated before you consult your pest management professional. They may harbor bed bugs which may not be treated.

If a decision is made to move during the course of a bed bug mitigation program, please see Appendix K "How to Move and Leave Bed Bugs Behind".

Summary of Bed Bug Treatment Methods

The following table has been published by the National Center for Healthy Housing and summarizes the different treatment methods discussed in the Treatment section. Information in the table is supported by case study and scientific literature. Retail costs in the table are relative to the time of publishing and region of the country.

Management Method	Primary Responsibility	Retail Cost Per System	Commentary	Compatibility with other methods
Laundering*	Resident	Dissolvable Bag: $22 for 10 bags	Laundered fabrics will be free of bed bugs as long as they are kept isolated from infested areas.	Include in every control effort.
Unit Preparation*	Resident	Varies	Poor housekeeping, sanitation, etc., are not necessarily conducive to bed bug infestations, but bed bugs are more likely to remain undetected and pest management efforts are more likely to fail in a cluttered home.	Include in every area so that the Pest Management Professional (PMP) can properly inspect the property.
Encasements*	Resident	$50 or more each for box spring and mattress	Bed bugs that are trapped in an encasement designed for use in bed bug control will not be able to feed or escape and will eventually die. Encasements keep bed bugs from infesting mattresses and box springs.	Use encasements either after treatment or before an infestation is found.
Monitors	PMP, resident, or staff	4 interceptors for $8. Carbon dioxide attractant devices $15-$950 initial cost.	Monitors will catch bed bugs, but are not meant to control infestations.	Monitors can be used alone or in combination with other detection and control methods to confirm active bed bug infestations.
Vacuuming*	PMP, trained staff, or trained resident	HEPA Vacuum for $250-$500	Vacuuming is not reliable as an **exclusive** control method.	PMPs, staff, and residents should use a vacuum to remove bed bugs during inspections and unit preparation.
Steam	PMP or trained staff	$500-$1,500	Steam wand must be moved at a rate that heats the area to a lethal temperature.	Use with other methods such as insecticidal dust for voids that steam cannot penetrate. Mattresses and box springs must be dry prior to encasement.

Management Method	Primary Responsibility	Retail Cost Per System	Commentary	Compatibility with other methods
Thermal Remediation Using Ambient Heat	PMP or trained staff	$330 for luggage-sized container. $90,000 for whole unit heater. $800-$2,000 to treat an apartment.	Lethal temperatures must penetrate all items for the treatment to kill all stages of bed bugs.	Heat treatment is a good option for cluttered homes where preparation is a struggle.
Bed Bug Detecting Canine	PMP	$10,000 to purchase. $1,300 per team per day.	Dogs are effective and efficient for large-scale (multi-unit) inspections.	Use with visual inspection. Treat in areas where the dog alerts.
Pesticides	PMP	Varies by product.	Consider the location of application, effectiveness of chemical, residual, and ovicidal properties of each product before selecting it.	Pesticides are used as needed in combination with other treatment methods.
Freezing Using Dry Ice/Liquid CO2	PMP	$6,900 for a machine.	Not widely used in the US, but widely used in Europe. Insufficient information for adequate assessment at this time.	More research is needed comparing the penetration of both heat and cold.
*** Should be incorporated into <u>every</u> treatment plan for optimal success**				

The following table summarizes the most common bed bug treatment methods. Deciding which method(s) to use depends on many factors. The pros and cons of each method are discussed below, with added recommendations for effective use.

Management Method	Pros	Cons	Recommendations
Steam	• Short exposure time for effective kill • No chemical residue • Useful in sensitive locations and on items that cannot be laundered or treated with pesticides • Efficacious and relatively inexpensive • Available to the public and facility managers for use	• Time consuming • Does not penetrate materials deeply • May blow bed bugs away • Moisture can damage electronics and other treated surfaces • Residual moisture raises mold concerns • Every location must be treated, no residual effect	• Use dry steam method if available • Move steam wand slowly to assure sufficient contact time (20 seconds/linear foot) • Diffuse pressurized air by using a nozzle attachment wrapped in fabric. This keeps bed bugs from blowing away. • Use as part of a comprehensive management program.

Management Method	Pros	Cons	Recommendations
Thermal Remediation using Ambient Heat	• Good for locations where unit preparation is difficult, less tenant preparation required in general • Kills all bed bug stages including eggs • No chemical residue • When properly used, effectively treats the whole unit at once • This is one of the only bed bug management methods that has potential to be used alone.	• Can fail if all locations in unit do not attain upper lethal temperature (~120F) • Typically costs more than other methods of treatment • NOT a "do it yourself" method. Untrained staff should not attempt thermal treatments.	• Trained PMP must monitor for appropriate temperature and time requirements and make adjustments as necessary to assure effective treatment of all locations. • Infested items can be treated with ambient heat in a containerized setting.
Freezing *Items placed in freezer*	• Widely available • Good for treating small personal items • Inexpensive	• Difficult to determine amount of time necessary to effectively kill bed bugs • Limited space • Placing items outside in the winter WILL NOT work • Temperatures must be <0°F to be effective (colder than most household freezer compartments)	• Cooling must be rapid to effectively kill bed bugs. • When used with other management techniques as part of a comprehensive program, freezing may be useful for small items that people don't want treated with pesticides.
Freezing *Liquid CO_2 treatments*	• Rapid freezing has been shown to kill bed bugs • No chemical residue • Useful in sensitive locations and on items that cannot be laundered or treated with pesticides	• Liquid CO_2 treatment methods are time consuming • Treatment does not penetrate materials deeply • May blow bed bugs away • Every location must be treated, no residual effect • Limited data on efficacy	• Freezing bed bugs using solid or liquid CO_2 is a "spot treatment" methodology and may be effective when used as part of a comprehensive management program.
Pesticides	• Relatively inexpensive • May provide quick relief • Widely available • Wide range of available options and locations that are "treatable" using liquid or dust applications.	• Bed bugs are becoming resistant to many commonly used pesticides. • Bug bombs ARE NOT effective against bed bugs and should not be used. • Some consumers have concerns over pesticide toxicity. • Pesticides used alone will not be effective in eliminating a bed bug infestation.	• A licensed and experienced PMP should be used. • PMP should identify ALL infested locations prior to treatment. • Choose pesticides carefully and apply judiciously based on individual factors of each infestation. • Always follow label instructions and use appropriate personal protective equipment.
NOTE: No treatment methodology can be guaranteed. It is important for the consumer to understand that while bed bugs may be eliminated at one point in time, this does not prevent bed bugs from being re-introduced. It is critically important for consumers to be educated on how to PREVENT an infestation from occurring.			

Preventing a Bed Bug Infestation in Multi-Unit Housing and Group Living Environments

Furniture and Room Guidelines

Bed bugs thrive under certain conditions which are enhanced by the availability of hiding spots close to their human hosts. Bed bugs have a strong preference for paper and wood, over metal and plastic. Porous surfaces provide more humidity and egg-laying locations. Furniture choices can greatly contribute to the control of bed bugs.

Guidelines for furniture include:

- Replace wood frame beds with metal frame beds to discourage bed bug hiding and egg-laying on beds.
- Eliminate head boards completely. Bed bugs hide and thrive in head boards.
- Replace all plush furniture with metal and plastic, or items easily cleaned with soap and water.
- Bedding and pillows should be able to be placed in a dryer and tumbled on a high setting.
- Use only white or light colored sheets so bed bugs can be easily seen.
- Choose white baby cribs or paint wooden baby cribs white. Fill gaps in the frames with silicone caulk. This will make inspection easier and reduce the chance of infestation. Do not use pesticides on baby cribs!
- Vinyl-covered or seamless mattresses are recommended for adult beds and cribs.
- If vinyl mattresses or encasements have holes, consider repairing them with duct tape or discarding them.
- Do not discard regular (non-vinyl) mattresses, only to replace them with other regular mattresses. Bed bugs will re-infest the new bedding quickly. Use mattress encasements designed for bed bugs.
- If a box spring is being used, be sure to encase it too. The box spring is more likely to harbor bed bugs than the mattress.
- Wooden dressers, wardrobes, tables and other furniture can be painted white for easy inspection. Any crevices where a credit card will fit should first be sealed with caulking.
- Discard any wicker furniture. Wicker provides infinite harborage to bed bugs and is almost impossible to treat effectively.

Donations of clothing and household items

Donations of clothing, shoes, coats, toys and other personal belongings are vital to many programs that help the disadvantaged. But sometimes when people discover bed bugs in their homes, they discard many personal belongings, and it is unclear how much of these discarded personal belongings make it to the donation stream. It is therefore important to be very careful about bringing donated items, and the bed bugs they may harbor, into your facility or home. Suggested precautions for donations include:

- Wash and/or DRY on a HOT setting, all clothing, shoes, coats, linens, blankets, and plush toys before distribution.
- Sort donations on a clean linoleum floor. Prevent the escape of bed bugs into your facility by sorting inside a perimeter of carpet (double-sided) tape placed around the working space. This creates a sticky barrier that bed bugs cannot cross.
- Shake out clothing; inspect books and toys carefully using the Identification guide in this manual.
- Do not accept cardboard boxes for donations to your facility. Instead use clear plastic bags.
- Keep sorted and laundered items sequestered (in sealed plastic bags or plastic totes with tight fitting lids) from items that have not been checked or treated.

Policy Statements for Shelters and Group Housing

Agencies and facilities managers should have policies in place that will help to prevent the spread of bed bugs. Suggested policy statements and reasoning include:

- Your belongings must be free of bed bugs, or you must be willing to work with facility staff to rid your belongings of bed bugs. – *This will prevent the introduction of bed bugs into our facility, and will help the resident to avoid future bed bug issues.*
- You may not bring into this facility items collected from the street, discarded items, donated furniture. – *With the increased number of bed bug cases, items on the streets are much more likely to contain bed bugs (the reason for being discarded). Therefore it is not safe to bring discarded or abandoned items into our facility.*

- If you have possibly been exposed to bed bugs, or suspect that you may have bed bug bites, you must tell the facilities manager. – *Early detection and management is very important for the control of bed bugs. Otherwise the number of bed bugs will increase rapidly.*
- The client must consult with a medical provider or social worker if bed bugs are suspected. – *There is help for clients with mental, physical, and financial needs that limit their ability to deal with bed bugs.*
- You must follow pre-treatment guidelines for a room you occupy. – *Following pretreatment guidelines will allow management to help get the bed bug infestation under control. Without cooperation, control will not be possible*.
- You **must not** use spray, fog, or dust pesticides on your own to treat for bed bugs or any other pests. – *Foggers cause bed bugs to spread, over-the-counter sprays may be ineffective, and bed bug control requires experience to know where to place insecticides to be effective against bed bugs.*

SITE-SPECIFIC GUIDELINES FOR MANAGEMENT AND PREVENTION OF BED BUG INFESTATIONS

Multi-Unit Housing

Bed bug infestations in multi-family housing can be particularly troublesome. An infestation in one apartment, if not handled properly, can spread to adjacent units or throughout a building and affect many people. The information in this section is designed to help residents and property managers work together to fight bed bugs in multi-family housing, and to provide specific suggestions for multi-family housing operators in handling an infestation.

In order to successfully eradicate a bed bug infestation, it is essential that all parties involved work together. Unfortunately, it is all too common for residents and property managers to let their frustration manifest itself by blaming each other. There are a few important ideas to keep in mind:

- Nobody asks for a bed bug infestation. Regardless of how the infestation started, it was certainly unintentional.
- No one profits or benefits from an infestation continuing. If there is no cooperation, everyone loses.
- Many people are uninformed about bed bugs, and don't understand what must be done to treat them. If you feel that a resident, landlord, or property manager isn't handling the situation properly, suggest that they read through this manual.
- Once a bed bug infestation has been identified, it takes a lot of work to get rid of it. Effective treatment requires the cooperation of three parties working together: resident, landlord and pest management professional. Without the participation of all three it will be nearly impossible to eliminate an infestation.

There should be no shame associated with having bed bugs in an apartment. It is not an issue of cleanliness – although clutter makes it more difficult to eradicate bed bugs, cleanliness cannot prevent the problem from occurring. Denial, shame and blame only make the situation worse. Once an infestation has been identified, the most important thing is to be proactive about treating it.

Where to Begin

Reporting a suspected infestation

Landlords, property managers AND residents are legally required to make a good-faith effort to address a bed bug infestation. If they don't, they can be held liable under Michigan's Housing Laws. Residents who suspect they have bed bugs should report the problem **promptly** to their property manager. Next, the apartment should be inspected to verify that bed bugs are present. Property managers or their staff may be able to make a preliminary identification of bed bugs, but generally should seek confirmation from a Pest Management Professional (PMP). For more information on inspection, see the **Inspection and Identification** within the **Treatment section** of this manual. In every step of the bed bug management process, property managers and tenants should keep careful records. This is for the protection of all parties involved. Inspections and verifications of bed bug infestations should be documented, as well as subsequent management decisions. It is MOST important for all parties to cooperate to rid the unit or building of bed bugs.

Once it has been established that there is an infestation in an apartment, the property manager and resident should meet to discuss a treatment plan. Since there may be a lot of work and expense involved, it may be helpful to sign a treatment agreement like the one provided in Appendix B. The residence should be scheduled for treatment with a PMP as soon as possible, and receive written instructions on how to prepare. The residence needs to be checked on the day before to make sure it has been prepared properly. Without proper preparation, the PMP will not be able to effectively treat the unit. Treatment should be postponed if the unit is not ready. Residents should plan to be home on the day of treatment to wash all of the clothing and bedding.

It may also be effective at this point for the property manager to notify other residents that bed bugs have been identified in the facility/complex. The notification should include basic information about bed bugs, how they spread, and a contact number for residents who may be concerned. Prompt reporting of bed bug infestations will help reduce the time and expense of treatment, so it is important that residents feel comfortable reporting a potential infestation.

Emergency Measures (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. See the "Isolating the Bed" for a description of how to isolate the bed to immediately reduce bed bug bites. These techniques may need to be adapted for use with platform-style beds.

Resident Responsibilities

A resident's primary responsibility is to cooperate with the pest management professional and property manager in treating a bed bug infestation. This means reporting any suspected infestations to property management, preparing the unit for inspection and treatment, following any instructions given by the PMP, and taking measures to prevent re-infestation. **Residents need to understand that if they fail to cooperate with treatment, they can be found legally liable and possibly even evicted from their apartment**. Residents should not attempt to eradicate bed bugs on their own; doing so may spread bed bugs to other units, or be more dangerous than the bed bug problem itself.

Preparing an apartment for bed bug treatment is a time and labor-intensive process. Property managers should discuss the process with residents and provide a checklist such as the one in Appendix C. For residents with special needs, it may be wise to enlist a family member, friend, or staff member to assist with the treatment steps and preparation. For detailed information on how to prepare an apartment for treatment, see the preparation recommendations supplied by the pest management professional or the Treatment section of this manual.

On the day of treatment, all clothing, bedding, towels, and other soft goods should be laundered in a washing machine with hot water and/or dried on high heat for at least 30 minutes. If the resident is using common laundry facilities, the items should be sealed in plastic bags for transport directly to the washing machine. To avoid releasing bed bugs in the laundry facility, infested laundry should be transferred directly from bags/containers to the machines, or dissolvable bags can be used. The washed belongings need to be folded and sealed in new plastic bags or plastic containers with tight fitting lids before being transported back to the resident's home. The property manager may consider closing the laundry facility so the residents receiving treatment can have exclusive use on the day of treatment.

Remember that it may take multiple treatments to completely eliminate a bed bug infestation. Residents should speak to their property manager and/or PMP about any concerns they have regarding treatment. It is also important to follow any instructions given by the PMP. Once the infestation has been eliminated, residents should take steps to avoid re-infestation. See the Prevention section for more specific information on preventing bed bug infestations and re-infections.

Property Management Responsibilities

Michigan law requires that landlords make a good-faith effort to provide housing that is free from bed bugs. Once the property manager has been made aware of a bed bug infestation, they should immediately arrange an inspection of the unit and if necessary schedule treatment with a pest management professional. Treatment can be expensive, but delaying treatment may cost more in the long run. Property management staff should wear protective suits and booties when doing work in an infested apartment. White suits will make bed bugs easier to spot. The maintenance staff should bring as little into the apartment as possible. Be cautious about the potential to move bed bugs to a new location on clothing or equipment.

In order for treatment to be effective, all the affected units must be treated at the same time. Ask the PMP to inspect any adjacent units (above, below, beside, and across the hall) to determine the extent of the infestation.

The resident might ask the manager to dispose of infested bedding or other upholstered furniture. The building manager should wrap the items in plastic and remove them to the

dumpster. Once outside, the furniture should be destroyed if possible and clearly marked with bright yellow or red spray paint as "Bed Bug infested" before it goes in the dumpster. This is to prevent the infested furniture from being recovered by another resident and brought back into the building.

Property managers have the responsibility and right to require their tenants to cooperate with a treatment plan. A resident's repeated refusal to cooperate should result in termination of the lease, because the problem will quickly spread if action is not taken, placing other residents at risk.

Additional Guidance for Property Managers

Pest Management Professionals (PMP's)

There is a complete listing of licensed pest management companies in the State of Michigan on Michigan's Bed Bug website (www.michigan.gov/bedbugs). Although this website lists all licensed contractors, not all will treat or have experience with bed bug elimination. Pest management professionals should also belong to recognized state or national professional associations. You will need to do some research and ask about experience with treating bed bugs. Treatment will be costly and some may offer guarantees and others won't. It is not unusual for a PMP to recommend three treatments over a four to six week period. Companies operating using best practices will provide written instructions for how to prepare a unit for treatment. Take the time to read and follow these instructions. Generally, property managers cover the costs of treating an infested unit, but residents can expect to incur the cost of treating and protecting their belongings (e.g. mattress encasements, laundering, etc.). Some property managers choose to assume all costs of preparation and treatment, in order to improve resident cooperation and outcome of treatment. Doing it right the first time can reduce bed bug treatment failure, saving money in the long run.

Importance of Detective Work

It can be helpful to determine from where the bed bugs may have come. The goal of an investigation is to prevent re-infestation, not to assign blame. Did either the resident or manager obtain used furniture recently? Did they visit another resident in the building or elsewhere that complained of bed bugs? If the source can be identified, it is important to figure out if it is located in the same building. Other possibly infected apartments should be inspected

as well. Elderly residents should be observed for signs of an infestation, such as bites and secondary skin infections. Ask residents to inform building staff whenever bed bug activity is seen, or if bedbugs are discovered in the common areas.

Record Keeping

It is important that infestation locations be tracked around the building. A building manager can do this by keeping a binder with a separate section for each floor and a map of the various units on that floor. In the binder, copies of the service tickets from your PMP and notes from inspections along with treatment agreements should be kept. Whenever bed bugs are discovered in one unit, the building staff may automatically check the neighboring units.

A staff person should accompany the PMP on the day of treatments. Building staff should carefully log what was done and render assistance with taking apart bedding and furniture for treatment.

Strategies for Dealing with Upset Residents

There are no easy answers on how to calm someone down who is being bitten by bed bugs. When a resident calls, offer to come up with your maintenance supervisor right away to investigate and inspect. Be prepared to discuss a treatment plan if bed bugs are discovered, including the following:

- Strategies for immediate relief (see "Isolating the Bed")
- Strategies for preventing spread to the common areas and other apartments in the building
- Provide a time line of what actions will be taken and when, so the resident can properly prepare
- Once you have discussed the treatment program, ask the resident to sign a treatment agreement

Follow up at each step to make sure the treatment plan is working and that they are cooperating. Make sure you respect the resident's dignity and privacy. You may want to consider closing the laundry facility so they have exclusive use on the day of treatment. Make sure the residents have the resources to pay for the cleaning. In some cases, a small investment by the property manager (e.g. quarters for the laundry) may improve the chance for an effective treatment.

Good communication with all residents about the problem is very important. Keep residents informed and they will help you enforce the treatment plan with hesitant residents. The more residents know about bed bugs, the more they will cooperate with rules that help keep the building bug free. It may be beneficial to have a pest management professional also come in and speak to your residents about bed bug prevention and detection.

Hospitality Industry

Why should your hotel be concerned about bed bugs?

Because you want to avoid:

- Thousands of dollars in pest control costs
- Lost revenue from out-of-service rooms
- Complaints filed by angry guests who were bitten
- Negative publicity, bad public relations
- Lasting damage to the reputation of the hotel affecting current and future occupancy levels
- Possible time-consuming and expensive lawsuits

Staff training and early detection

As a hotel, there is unfortunately very little that you can do to prevent bed bugs from being introduced into your hotel. You cannot tell which guests may be bringing bed bugs with them. Therefore, it is critical for hotels to be vigilant for the early signs of a bed bug infestation. These signs may include:

- Small brownish or reddish marks left on bedding.
- Bed bugs, eggs, or cast skins especially around seams of mattresses and behind headboards.
- Live bed bugs anywhere in the room.
- Complaints from guests who wake up with itchy bites.

Well-trained housekeepers are the staff members most likely to detect an early infestation. Although bed bugs are good at hiding, they often leave telltale marks on bedding. Housekeeping staff should be trained to look for small, brownish or reddish marks left on sheets, pillows, or the seams of mattresses or bedding. Housekeepers should also be encouraged to report any signs of bed bugs, and their vigilance should be praised and recognized, even when they are mistaken. Remember, the goal is for your hotel's staff to discover any bed bugs before your guests do!

Maintenance staff should also be trained to recognize bed bugs. Maintenance staff may encounter bed bugs hiding in wall cracks, behind electrical outlets, in bed frames or under the edges of carpet and peeling wallpaper. Again, vigilance is key – have all staff trained to recognize and report any sign of bed bugs in your hotel.

Guest complaints

A guest complaint is the worst way to find out about a bed bug infestation. Although some complaints may prove to be false alarms, it is important to take every incident seriously. Not everyone reacts to bed bug bites in the same way - some people don't develop a reaction until several days later, and others may not react at all. Therefore, an infestation may be present in a hotel room for a while before anyone complains.

When a guest complains of insect bites after sleeping in your hotel, they should be immediately offered a new room in a different area of the hotel (not immediately above, below, or beside the previous room). A manager should offer to speak with them about their concerns, and the room should be carefully inspected by a professional pest manager (PMP).

Once the inspection is complete, the results of the inspection should be shared with the guest. If the inspection has confirmed the presence of bed bugs, then the hotel may consider offering the guest a refund for their stay.

To protect the hotel, it is critical to keep detailed records of everything that is done in response to a bed bug complaint. Documentation of the complaint, the hotel's response, the PMP's inspection, and any bed bug treatment performed help decrease negative public relations stemming from the incident and can be tremendously valuable in the event of a lawsuit. To assist with this recordkeeping, a sample form is provided in Appendix D.

Dealing with a possible infestation

At the first sign of bed bugs, the affected room(s) should be taken out of service, and guests moved to another room. No one, not even housekeeping, should enter the room until it has been inspected by a PMP. If the PMP conducts a thorough inspection and finds no evidence of bed bugs, then the room can be placed back in service. However, if the PMP finds any

evidence of a bed bug infestation in the room, then they should also inspect all adjacent rooms (both sides, above, below, and across the hall). If the PMP confirms the existence of bed bugs in the guest's room, make sure the room the guest(s) were moved to is carefully inspected as well. Bed bugs can attach themselves to the guests clothing or luggage and easily be spread under such circumstances.

Any infested rooms identified by the PMP should remain out of service until they have been completely and successfully treated. This may take several visits from a PMP.

As mentioned previously, it is in the hotel's best interest to keep records of any bed bug treatments performed in the hotel. Always remember, a hotel's housekeeping staff is the first and most important line of defense. Make sure to keep current staff vigilant and train new staff on how to identify the tell-tale signs of bed bugs.

Other ways to fight bed bugs

- Choose furniture of plain design. A metal chair offers fewer places for a bed bug to hide than a wicker one.
- Don't furnish your hotel with used furniture.
- Choose light-colored bedding—easier to see bugs and blood spots.
- Choose bedding that does not hang down to the floor.
- Use tightly fitting, zippered, bed-bug proof mattress and box spring encasements. Putting them in place ahead of time (proactively) makes bed bugs easier to see since encasements have no piping or tags and they're light-colored
- Vacuum guest rooms regularly. Use an attachment to get in cracks and crevices.
- Keep used bed linens in a sealed plastic container, separate from clean linens to prevent bed bugs from spreading by cross-contamination of bedding.
- Avoid bringing housekeeping carts into guest rooms – keep them in the hallway where they are less likely to pick up hitchhiking bed bugs.
- Seal cracks in walls and wooden floors.
- Repair peeling wallpaper.

Shelters and Transitional Living

The appearance of bed bugs in homeless shelters is becoming increasingly problematic. The transient lifestyle of the homeless population makes them particularly vulnerable to bed bugs due to potential exposure to bed bug infestations in emergency shelters, transitional housing, motels and hotels, homes of friends, etc. Outlined below are key considerations for shelter staff to consider when faced with a bed bug infestation:

Prevention

Screening

Homeless shelters and other emergency housing facilities should incorporate bed bug screening into **intake and assessment procedures**, as clients may bring along bed bugs from their previous living arrangements. Exposure to bed bugs can be incorporated into medical questions related to other public health pests such as lice, scabies, and presence of cockroach allergies or asthma. It is possible that in some cases, bites will be evident, but the client may not know or be concerned that they have been exposed to bed bugs.

Questions should be phrased compassionately, as this may be the first educational experience a person has about bed bugs. Suggestions include:

- *"Have you stayed in a place where you think you may have been exposed to bed bugs in the past three months?"*
- *"Has anyone in your family been bitten by bed bugs or do they have bites or blisters that you're concerned about?"*
- *"Bed bugs, lice, scabies and other things can cause medical concerns. Do you need help with a bed bug, or any other pest, issue?"*

Shelter Policies and Policy Statements

If a client indicates that they believe they have been exposed to bed bugs or they know they have bed bugs, immediate help is necessary to avoid spreading them within the shelter or home.

- Provide literature to the individual or family about bed bugs and their management and prevention. Contact your local health department, the Michigan Department of Community Health, or www.michigan.gov/bedbugs for information to provide to clients.

- When placing an individual or family into a shelter, notify your administration of the bed bug issue.
- Respond to bed bug complaints immediately.

It is important to never refuse shelter to clients with symptoms of bed bug infestations. Rather, incorporate a **Bed Bug Treatment Agreement** into compliance with the shelter's rules. Refer to Appendix B for a sample Bed Bug Treatment Agreement. If a client refuses to follow procedures for bed bugs, such as inspecting belongings, laundering, or medical attention, the shelter staff may need to build this into their case plan. It would be appropriate to review shelter procedures regarding bed bugs with the client, and hold the resident responsible by having all parties sign the agreement. It is crucial to have the cooperation of *both* the shelter staff and the resident in order to most effectively eliminate a bed bug infestation.

Agencies and facilities managers should have policies in place that will help to prevent the spread of bed bugs. Suggested policy statements and reasoning for bed bug prevention include:

- Your belongings must be free of bed bugs, or you must be willing to work with facility staff to rid your belongings of bed bugs. – *This will prevent the introduction of bed bugs into our facility, and will help the resident to avoid future bed bug issues.*
- You may not bring into this facility items collected from the street, discarded items, donated furniture. – *With the increased number of bed bug cases, items on the streets are much more likely to contain bed bugs (the reason for being discarded). Therefore it is not safe to bring discarded or abandoned items into our facility.*
- If you have possibly been exposed to bed bugs, or suspect that you may have bed bug bites, you must tell the facilities manager. – *Early detection and management is very important for the control of bed bugs. Otherwise the number of bed bugs will increase rapidly.*
- The client must consult with a medical provider or social worker if bed bugs are suspected. – *There is help for clients with mental, physical, and financial needs that limit their ability to deal with bed bugs.*
- You must follow pre-treatment guidelines for a room you occupy. – *Following pretreatment guidelines will allow management to help get the bed bug infestation under control. Without cooperation control will not be possible*.

- You must not use spray, fog, or dust pesticides on your own to treat for bed bugs or any other pests. – *Foggers cause bed bugs to spread, over-the-counter sprays may be ineffective, and bed bug control requires experience to know where to place insecticides to be effective against bed bugs. Do it yourself pesticides are illegal in city facilities. Similar laws may apply to other residences.*

Handling Complaints

Bed bugs and other pests sometimes elicit fear and panic in people. Most are unwilling to live with pests, especially those that bite. However, some individuals are resigned to living with bed bugs and may be the source of an infestation in an adjacent unit or room. Complaints about pests or bites must therefore be handled IMMEDIATELY and with concern, but also with a logical approach that relies on science and pest control expertise. The typical course of events would be complaint, inspection (of one or many units), confirmation, cleaning, treatment, future prevention, and follow up to be sure the problem was handled adequately.

Designation of a pest management coordinator in your organization can streamline the handling of complaints and infestations. There should be one person in charge of overseeing the inspection and treatment process. Often this is the building or facility manager.

Encourage clients to speak openly about bed bugs and other pests and to ask for help. Be sensitive to their concerns. Use resources available to you, and gather the contact information of experts, such as your pest control company's staff entomologist, to ensure a quick response.

Furniture and Room Guidelines

Bed bugs thrive under certain conditions which are enhanced by the availability of hiding spots close to their human hosts. Bed bugs have a strong preference for paper, cloth and wood, over metal and plastic. Porous surfaces provide more humidity and egg-laying locations. Furniture choices can greatly contribute to the control of bed bugs.

Guidelines for furniture include:

- Replace wood frame beds with metal frame beds to discourage bed bug hiding and egg-laying on beds.
- Eliminate head boards completely. Bed bugs hide and thrive in head boards.

- Replace all plush furniture with metal and plastic, or items easily cleaned with soap and water.
- Adding smaller cushions that can be placed in a dryer is one way to make residents more comfortable. Cushions should be dried on a hot setting if bed bugs are an issue.
- Use only white or light colored sheets.
- Use wooden baby cribs, but choose models that are painted white. Paint existing wood colored cribs white. Fill gaps in the frames with silicone caulk. This will allow for much better inspection and reduce need for treatment. Avoid using pesticides on baby cribs!
- Vinyl-covered or seamless mattresses are recommended for adult beds and cribs.
- If vinyl mattresses have holes, consider repairing them with tape or discarding them.
- Do not discard regular (non-vinyl) mattresses, only to replace them with other regular mattresses. Bed bugs will re-infest the new bedding quickly. Use mattress encasements (see below).
- If a box spring is being used, be sure to encase it too. The box spring is more likely to harbor bed bugs than the mattress.
- Wooden dressers, wardrobes, tables and other furniture can be painted white for easy inspection. Any crevices where a credit card will fit should first be sealed
- Discard any wicker furniture. Wicker provides infinite harborage to bed bugs and is almost impossible to treat effectively.

Mattress Encasements

Mattress encasements are zippered enclosures that cover the entire mattress, as if it were bagged. Encasements should always be used for non-vinyl mattresses and box springs in bed bug prevention and management. Special bed bug-proof encasements are made of high quality cloth material, so they do not tear easily, and they have no folds around the zipper for bed bugs to find shelter. Cheaper vinyl encasements are available but need to be installed carefully to avoid tears in the vinyl. If a small hole appears, duct tape can be used to repair it. Holes MUST be repaired to prevent bed bugs from either gaining protection on the inside of the cover, or to prevent bed bugs from escaping from the infested bedding. Encasing both mattress and box spring eliminates the need to discard bedding by trapping bed bugs inside and providing a smooth simple outer surface that can be inspected, vacuumed and cleaned easily.

It is highly recommended that mattresses and box springs be encased, to preserve the sleeping area and to make bed bug inspections quick and easy.

Other Room Guidelines

- Moldings and joints around the room perimeter (floor, doors, cabinets, and windows) should be caulked with silicone sealant to eliminate hiding spots for both bed bugs and cockroaches.
- Openings around pipes or other structures that come through walls, floors and ceilings must be sealed. This will help with bed bugs, mice and cockroaches.
- People should keep sleeping in the room to avoid spreading bed bugs to other rooms or apartments, when possible.
- Residents should not store belongings under the bed when dealing with a bed bug infestation. This provides plenty of hiding spots that are difficult to clean.

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 approach the spread 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.

Donations of Clothing and Other Household Items

Donations of clothing, shoes, coats, toys and other personal belongings are vital to many programs that help the disadvantaged. But sometimes when people discover bed bugs in their homes, they discard many personal belongings, and it is unclear how much of these discarded personal belongings make it to the donation stream. It is therefore important to be very careful

about donated items to avoid the introduction or spread of bed bugs in your facility or home. Suggested precautions for donations include:

- Wash and especially DRY on HOT all clothing, shoes, coats, linens, blankets, and plush toys before distribution.
- Sort donations on a clean linoleum floor. Prevent the escape of bed bugs into your facility by sorting inside a perimeter of carpet (double-sided) tape placed around the working space. This creates a sticky barrier that bed bugs cannot cross.
- Shake out clothing; inspect books and toys carefully using the identifying guide in this manual.
- Ban all cardboard boxes for donations from your facility. Instead use clear plastic bags.
- Keep sorted and laundered items away from items that have not been checked or treated.

Treatment

If a facility is facing a bed bug infestation, the most effective program recommended for eliminating bed bugs is one that utilizes Integrated Pest Management approach. A more in-depth explanation of this approach is outlined in the Treatment section, which addresses inspection, identification, record keeping, cleaning, clutter reduction and bed bug habitats, pesticide use, follow-up procedures, and awareness and education about bed bugs.

Control practices require the cooperation of both the client and the shelter staff. **Helping a client immediately with bed bugs is critical.** Help may be in the form of medical attention, laundering clothes, and isolating their belongings while a control strategy is formed. More specifically, those in need who are suffering with bed bugs will need specific things in order to cooperate in the process of eliminating bed bugs from a shelter or group home. These include:

- Instructions for preparing their belongings and rooms or apartments for bed bug treatment.
- Plastic bags for storage of belongings and clothes. Bags must be tied tightly or sealed well to prevent transfer of bed bugs into or out of bags.

- Access to laundry, particularly a dryer, to clean clothes, linens, pillows, plush toys, coats, and shoes of bed bugs. Heat will kill all life stages. Access to laundry may require money for use of a Laundromat.
- Cleaning supplies or services.
- Some may need help in the form of physical labor for cleaning.
- Emotional support may be required. Many bed bug sufferers describe post-traumatic stress disorder-type symptoms associated with the stress of their infestation.
- Access to basic necessities, such as clothes or children's toys.
- If displaced from their home as a result of bed bugs, the client may need legal help.
- A person or family with bed bugs may require an advocate to help them get fair treatment with housing, schools, and other services.

Emergency Funding

If your shelter is a recipient of **Emergency Shelter Grant (ESG)** dollars, you may be able to use these funds to purchase steam cleaners, mattress encasements, etc. in order to mitigate bed bugs in your facility. For more information, contact your local Public Housing Authority ESG grantor.

Long Term, Nursing, and Assisted Living Facilities

Hospitals

Most hospital environments are not conducive to bed bug infestations. Rooms are designed to discourage harborage of potentially infectious pathogens and surfaces are cleaned regularly. Furniture is typically metal and rooms are sparsely furnished and free of clutter, for ease of cleaning. It is possible that a patient could bring bed bugs into a hospital in their belongings. These are typically transient introductions and infestation is unlikely to result in a modern setting. If a hospital suspects a bed bug infestation, they should contact a licensed pest management professional for assistance.

Long-Term Care Facilities

Long-term care, nursing and assisted living facilities face special challenges when it comes to dealing with bed bugs. Residents often have limited mobility and may have physical or mental health difficulties that make it difficult or impossible to communicate that they are being bitten. Furthermore, residents may be hesitant to report bed bug concerns for fear of being stigmatized or evicted. Therefore, it is critical that these facilities be especially vigilant for any signs of bed bugs.

Sleeping rooms and common areas should be regularly inspected for bed bugs. See the Inspection section for specific information what to look for. Bedding can also be checked for signs of infestation when it is changed. Staff who assist residents with bathing should be trained to look for and report skin lesions. There are a number of skin conditions that can affect people in long-term care settings, including MRSA (methicillin-resistant *Staphylococcus aureus*), scabies, and pressure sores. Bed bug bites should be considered when a patient is experiencing inflammatory lesions in which other causes have been ruled out and typical treatments have failed.

Intake evaluations for new residents should include bed bug screening. Facilities should be very cautious about allowing residents to bring in their own furniture. If the facility allows outside furniture to be brought in, the items should be inspected to ensure that they are bed-bug free.

Shared equipment like wheelchairs, trays, and carts should be stored away from sleeping areas and should be disinfected between uses.

If a bed bug infestation is suspected in a long-term care facility, it is vitally important that the facility contact a licensed pest management professional immediately. The longer an infestation is allowed to develop, the more difficult it can be to eradicate. The pest management professional should conduct a thorough inspection and work with the facility management to develop a treatment plan. Because it may not be practical to relocate the affected residents, treatment strategies should conform to an Integrated Pest Management plan so as to minimize exposure to pesticides.

When an infestation is confirmed, it is important to be sensitive to the concerns of affected residents. Residents may feel ashamed and may not want others to know that they are having a problem with bed bugs. These concerns will have to be balanced with the need to control the infestation. Reassure residents that the bed bug infestation is not their fault, and that bed bugs are not indicative of poor hygiene or housekeeping. With the resident's consent, notify family members and other regular visitors that bed bugs have been found in the facility, and provide them with educational materials so that they can check for bed bugs in their own homes.

Staff, residents, and family members are encouraged to report bed bug infestations promptly to facility management. Educate yourself, staff, and residents using this guide. If the problem persists, complaints can be made to the Michigan Department of Community Health Bureau of Health Systems at 1-800-882-6006.

Camps

Camps can range from daycamps conducted for several hours in a day (not overnight) to programs that are residential and involve many weeks in group settings.

Daycamps, where campers do not sleep at the camp facility, are unlikely to be an environment conducive to bed bugs. For these types of camps, a similar approach to the one outlined for schools would be appropriate.

Residential camps, where campers sleep at the camp facility, are at significant risk for bed bug infestations. The risk of infestation can be reduced by replacing wood bed frames with metal frames and using vinyl-covered mattresses or zippered mattress covers. If feasible, inspecting and cleaning beds and mattresses between camp sessions may help to identify bed bug problems early on, when they are easier to treat.

Keeping sleeping areas tidy and clean can also make it easier to spot a bed bug infestation. Campers should be instructed to tidy up their sleeping area regularly, eliminating any unnecessary clutter and vacuuming if appropriate. It is also prudent to keep each camper's belongings separate, preferably in sealed containers.

It may be difficult to distinguish bed bug bites from other bug bites. Because campers are frequently outdoors, they interact with many biting insects throughout their camp stay. See Health Concerns Associated with Bed Bugs for more information on bug bites. Campers should be encouraged to use bug repellents to ward off bites from mosquitoes, ticks, etc. Although these repellents are not effective against bed bugs, they can help to reduce other bites. If a camper is regularly using repellent and they are still finding a significant number of new bites, their sleeping area should be inspected for bed bugs. See the Inspection section for information on what to look for when a bed bug infestation is suspected.

If a suspected bed bug is found in a camp sleeping area, the following procedures are recommended:

1. The camp director should contact their pest management company and/or local health department for assistance in identifying the specimen(s). It is important to confirm that the bugs found really are bed bugs before proceeding.

2. If the specimen is confirmed as a bed bug, then the entire cabin, tent, or room should be inspected, as well as any adjoining rooms or sleeping areas.

3. If a sleeping area is found to be infested, all the campers' machine-washable bedding, clothing, towels, etc. should be machine dried for 30 minutes on the hottest recommended setting, and then sealed into plastic zippered bags. Once their belongings have been treated, the affected campers should be moved to another (non-infested) sleeping area.

4. There is no reason to exclude affected campers from camp activities. Bed bugs infest places, not people, and there is no scientific evidence that bed bugs spread disease.

5. Before the affected campers return home, the camp director or nurse should inform the campers' parents and/or guardians of their child's exposure or potential exposure to bed bugs. Educational materials should also be provided to the families, such as those found at www.michigan.gov/bedbugs.

6. Ongoing pest management should be overseen by the camp director in partnership with a licensed pest management professional and should conform to an Integrated Pest Management plan. Previously infested areas should not be used until they are certified as bed bug free by a pest management professional.

Dormitories

Dormitories and other student housing options at universities generally present the same set of problems with infestation and control as other multiple-unit housing structures. The infestation problems are presumably magnified by the high turnover rate in the units and the presence of international students and their families. In some ways, university housing may have more in common with the hotel industry, given the turnover rates of tenants and inclusion of well-traveled individuals from many different countries. Additionally, there is a high rate of movement and exchange of used furniture in these settings, coupled with a low awareness and recognition of the problem in the general student population.

Dealing with bed bug issues in dormitories will likely remain university-specific and similar to how they are handled in other multi-unit housing facilities. However, given the likelihood that the increasing presence of bed bugs in Michigan will also impact its universities, we suggest the following:

- Notify students before they move in that bed bugs are a potential problem and that they should be aware of what to look for and take precautions against introducing the bugs into their rooms. We suggest that an informational sheet be given to each student before they move in. This informational packet should emphasize overall awareness of the problem and the dangers of bringing in or trading used furniture, etc., and in failing to inspect luggage and bedding
- The Resident Advisor (RA) staff should be trained to recognize signs of infestation. They would likely be the first contact if a bed bug problem is suspected.
- Housing unit staff should also be trained to identify signs of bed bugs. An opportune time to identify a problem would be as units are being cleaned between tenants. See the Inspection section for details on what to look for.
- Once a bed bug problem is identified, have a clear plan of action that involves explaining treatments to the students, inspecting adjacent dorm rooms, and planning follow-up treatments and inspections. As part of treatment, recommend that bedding and clothing be laundered and dried on the hottest setting for 30 minutes. For a sample letter that can be used to notify and educate students, see Appendix L.

- Thorough record keeping and documentation of treatments is essential in remediating bed bug problems and reducing re-infestations in units, and in tracking the potential spread of the insects to other housing complexes.

Recommended treatments for dormitories would essentially be the same as for apartments or hotel rooms. As discussed above, the treatment options will be based on the experience and expertise of the housing and pest control department staff, and the resources available. For example, the purchase of a heat treatment apparatus (approximately $50,000) may be a cost effective option at large universities.

Schools and Child Care Centers

Background

In general, school 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.

School and child care centers with napping infants and toddlers may provide the type of environment suitable to support a bed bug population (NOTE: "In-home" child care environments may become infested with bed bugs by the occupying family, or by children in care). If children in this type of setting are experiencing skin conditions that might be associated with bed bug bites, then it may be necessary to investigate the school or child care setting as well as the child's home setting. See the Inspection section for information on what to look for when a bed bug infestation is suspected.

Michigan's Departments of Community Health (MDCH), Human Services (MDHS), and Education (MDOE) jointly support the following statements for the management of bed bug infestations within school communities. These recommendations may change over time as prevention and treatment techniques evolve. Although policy decisions are ultimately up to the school administration, school officials are urged to consider these recommendations:

Policy Recommendations

Currently there is no scientific evidence demonstrating that enforced exclusion policies are effective at reducing bed bug transmission in the school environment. MDCH, MDHS, and MDOE currently support a policy in which schools develop a response plan based on the management principles outlined in this manual. An appropriate response plan would include the following:

- An established school Integrated Pest Management Plan (IPM) plan. If a school IPM plan is not in place, contact the Michigan Department of Agriculture for assistance.
- Train staff 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 (see Procedures below).
- 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.

Roles and Responsibilities

Parents have the ultimate responsibility for their children. This includes:

- Assisting in the prevention and management of bed bugs through regular checks when bed bugs are found in the class, on the child, or in the home, educating themselves and their children, and making immediate arrangements for inspection/treatment when bed bug infestation is suspected or confirmed.

School communities have responsibility for:

- Developing school procedures to support prevention and control.
  - Policies and procedures should include the following elements:
    - Individual school bed bug policy.
    - Enforcement procedures for children with recurring evidence of bed bug infestation in the home, or repeat violators of the school's bed bug policy.
  - Training and designating an individual(s) to evaluate chronic cases within the school and/or school district that will work together with other local agencies to achieve compliance with the school's bed bug policy.
  - Disseminating current information about bed bugs.
  - Holding educational sessions for parents/caregivers and children if necessary.

- Alerting parents/caregivers when cases have been identified and urging vigilance at home.
- If tenant/landlord conflicts impede timely treatment, parents should be advised to talk with local agencies responsible for housing and code enforcement, human services, or the local health department.

Local Health Departments/Agencies have responsibility for:

- Providing technical support and knowledge to schools.
- Disseminating the most current information on bed bug prevention and control.
- Enforcement of Michigan's Public Health Code.

Procedures

Procedures to follow if a bed bug is found

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 pest management company or Michigan State University Diagnostic Services 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 Appendix F for a sample parent notification letter.

4. If a confirmed bed bug was found on a child, then the school principal or nurse or center program director should inform the child's parents or guardian by phone. An inspection report should be sent home with the student, and completed promptly. See Appendix G for a sample form. Educational materials such as those found at www.michigan.gov/bedbugs should also be provided to the family.

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 outlined in "Bed Bugs: What Schools Need to Know" (see Appendix E).
- Investigate other sources of bed bugs on school property such as lockers, buses, common areas or other areas where students routinely congregate.

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 or designee or the center program director and must conform to the school/center's integrated pest management plan, as required by Michigan law (MCL 324.8316).
- 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. See the section of this manual on Pre-Treatment Preparations.
    - The family must follow the recommendations for clothing and personal school item sanitation outlined in the "Bed Bugs: What Schools Need to Know" pamphlet. 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 can not afford professional treatment, the family should be directed to the Michigan Department of Human Services to determine if they are eligible for public assistance funds. School districts may also be able to leverage their pest management contracts to get discounts for impacted school families.
- In cases where tenant/landlord dispute is delaying effective treatment, parents should be directed to contact the local housing or code enforcement agency **if one exists**. They are normally located or associated with a city or county seat. In the State of Michigan, landlords/property managers are responsible for providing a vermin-free living environment. Housing or code enforcement agencies are responsible for making sure properties are inspected, licensed, and operated according to State and local housing laws and ordinances. Code enforcement officials 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.
- Treatment failure may result from inexperienced, unlicensed pest management. Michigan law states that landlords/property managers should only contract licensed pest management professionals, and if conducting "in-house" pest management, must have a certified applicator on staff. For more information about these laws or if there is concern about pesticide mismanagement or the use of an unlicensed firm, contact the Michigan Department of Agriculture Pesticide and Plant Pest Management Division.
- **In rare or extreme cases, a school may have to confront a situation where a parent or caregiver is incapable or unwilling to remedy a bed bug infestation in the home.** These cases are difficult because a school must weigh several important factors:

- Providing a healthy, pest-free environment for students to learn is a prime responsibility of the school.
- Providing a healthy, pest-free environment for staff is also a responsibility of school administrators.
- Providing a safe and healthy living environment is a responsibility of the parent or caregiver, and NOT the school.
- Repeated bed bug introductions by a student constitute a risk to other students and staff. While bed bugs do not transmit disease, they are a health issue because they are blood-feeding, human parasites. Once established in a home they can cause physical and psychological symptoms, and present a significant economic investment to eradicate. These facts are also true at the school level. Repeated inspections and potential treatment by pest management professionals, anxiety, frustration and lost instructional time on the part of staff, and administrative efforts constitute a serious cost both economically and in educational efficiency.

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 policy recommendations 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. State or Federal educational requirements for certain groups of students may require schools to make alternative “at home” accommodations.

Other options in rare or extreme cases may include:

- Notifying Child Protective Services in instances of suspected neglect.
- Notifying local truancy or prosecutor offices if the child, due to repeated infestation, is missing an excessive amount of school

Decisions to act through Children's Protective Services or local truancy or prosecutor's offices should be a last resort. Every effort should be made to assist the family with control of bed bugs before taking this action.

For questions and assistance with school policy development, contact the Michigan Department of Education at 517-373-3324.

APPENDICES

A - Matrix of Michigan Laws and Regulations

Regulation of Housing, Residences, and Facilities

In general, places where people live or sleep are regulated under the Housing Law of Michigan and local ordinances, which are enforced by code compliance offices for local units of government. There are also laws that apply to business owners that operate specific types of housing, residences, and facilities. To operate these businesses, the owner must meet minimum standards to obtain a license or to participate in government-funded programs. Standards usually require that premises be maintained in a clean and sanitary condition, free from insects, vermin, and rodents, and prohibit conditions that are detrimental to human health.

The table below identifies laws that establish standards for different types of housing, residences, and facilities that could harbor bed bugs, and the regulatory agencies that are responsible for compliance. In addition to the regulatory authority that is listed, local health officers may be authorized to investigate and take action, as appropriate, where a condition is a nuisance or threat to the public's health.

Type of Housing, Residence, or Facility	Citation to Law	Regulatory Agency	Contact Information
Dwellings used for living or sleeping	Housing Law of Michigan, MCL 125.401 *et seq.*, and local ordinances.	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government
Adult Foster Care Facilities	Adult Foster Care Facility Licensing Act MCL 400.701 *et seq*.	Michigan Department of Human Services	Bureau of Children and Adult Licensing: 866-856-0126 or online at: www.michigan.gov/dhs/0,1607,7-124-5455_27716_27723-80945--,00.html

Type of Housing, Residence, or Facility	Citation to Law	Regulatory Agency	Contact Information
Agricultural Labor Camps	MCL 333.12401 et seq. R 325.3601 *et seq.*	Michigan Department of Agriculture	Environmental Stewardship Division: 517-241-0236
Bed and breakfast	See "dwellings". Governed by Housing Law of Michigan and local ordinances. MCL 125.1504b	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government
Boarding Schools	Revised School Code, MCL 380.1335	Michigan Department of Education	Office of School Improvement: 517-373-4631
Campgrounds	MCL 333.12501 *et seq*.	Department of Natural Resources and Environment OR Local Health Department	MDNRE: 517-241-1340 Local Health Department List: www.malph.org
Child Care Organizations (Includes children's camps, child care facilities, nursery schools, children's group homes, foster homes, residential facilities for children with mental illness or developmental disabilities, maternity homes for unwed mothers who are minors, etc.)	Child Care Organizations Act, MCL 722.111 – 722.128	Michigan Department of Human Services	Bureau of Children and Adult Licensing: 866-856-0126 or online at: www.michigan.gov/dhs/0,1607,7-124-5455_27716_27723-80945--,00.html
Cooperative housing	Housing Law of Michigan and local ordinances	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government

Type of Housing, Residence, or Facility	Citation to Law	Regulatory Agency	Contact Information
Health Facilities (Includes, for example, hospitals, nursing homes, county medical care facilities, and hospices).	Public Health Code Parts 201, 206, 214, 215, 217. There are rules that set out standards for each type of health facility. Also, if Medicaid or Medicare certified, health facilities must meet federal conditions for participation.	Michigan Department of Community Health, which implements licensing standards and provider requirements for participating in Medicaid. The U.S. Department of Health and Human Services enforces federal standards for participating in Medicare	Bureau of Health Systems: 517-334-8408 Complaint Hotline: 800-882-6006 www.michigan.gov/mdch
Homeless shelters	See "dwellings". Governed by Housing Law of Michigan and local ordinances. State Housing Development & Authority Act MCL 125.1401 et esq.	Code compliance for local units of government Michigan State Housing Development Authority (Government funded)	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government MSHDA Office of Rental Development and Homeless Initiatives: 517-241-1609 www.michigan.gov/mshda
Homes for the Aged	Public Health Code, Parts 201 and 213	Michigan Department of Human Services	Bureau of Children and Adult Licensing: 866-856-0126 or online at: www.michigan.gov/dhs/0,1607,7-124-5455_27716_27723-80945--,00.html
Hotels and motels	Hotels, inns and public lodging houses, MCL 427.1 et seq. See "dwellings". Governed by Housing Law of Michigan and local ordinances.	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government

Type of Housing, Residence, or Facility	Citation to Law	Regulatory Agency	Contact Information
Low income and transitional housing	State Housing Development & Authority Act MCL 125.1401 et esq. See "dwellings". Governed by Housing Law of Michigan and local ordinances.	Michigan State Housing Development Authority US Department of Housing and Urban Development Code compliance for local units of government	MSHDA Office of Rental Development and Homeless Initiatives: 517-241-1609 www.michigan.gov/mshda Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government
Psychiatric facilities	Mental Health Code, MCL 330.1101 et seq.	Michigan Department of Community Health	Bureau of Health Systems: 517-334-8408 Complaint Hotline: 800-882-6006 www.michigan.gov/mdch
Residential rental property (Landlord & Tenant)	See "dwellings". Governed by Housing Law of Michigan and local ordinances.	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: www.maceo.org OR contact your local city/township government
University student housing	See "dwellings". Governed by Housing Law of Michigan and local ordinances.	Code compliance for local units of government	Michigan Association of Housing Officials website: www.maho-mi.org Michigan Association of Code Enforcement Officers website: http://www.maceo.org/ OR contact your local city/township government

B - Sample Treatment Agreement

Please read the educational materials about bed bugs that we have provided to you. A member of our staff will review these materials with you in detail. Bed bugs are a serious problem, and you will have to work together with us and our pest management professional (PMP) to eliminate the infestation in your home and prevent it from spreading to other units.

By signing below, you are agreeing to make the necessary preparations. Failing to cooperate and/or being fully prepped for treatment can result in termination of your tenancy.

Resident Responsibilities – Please initial after reading each point below:

_____ I understand that may need to arrange for family member or friends to help me prepare.

_____ Remove all loose items from the floor and closets in all rooms, and move items away from baseboards.

_____ Strip all beds, including hideaways and sleeping bags used as bedding. If possible, lean box springs and mattresses against the wall.

_____ Empty dresser drawers, nightstands, desks, and other storage units so that they can be inspected and/or treated. Place the removed items into sealed plastic bags and follow any instructions given for inspecting and/or treating the items before removing them from the bags after your unit has been treated.

_____ I understand that my thorough cleaning of the apartment in advance of the treatment will make it easier and more effective. If I use a vacuum, I will be sure to seal the vacuum bag and dispose of it in the dumpster after each use.

_____ If possible, move all furniture away from the walls.

_____ All wall-mounted items such as pictures and mirrors should be removed from the walls for inspection and/or treatment.

_____ Remove any window treatments in infested areas and launder appropriately.

_____ Clear off all shelves.

_____ All clothing should be laundered and dried in a dryer on high heat for at least 30 minutes.

_____ Remove any personal items that you do not want anyone to see, as the inspection will be very thorough.

_____ Check pet areas and launder pet bedding. Remove pets from the unit before the treatment. Cover and turn off fish tanks.

_____ While your unit is being treated, launder all bedding, drying on high heat for at least 30 minutes.

_____ Stay out of the unit for the amount of time specified by the PMP.

_____ Follow any additional instructions given to you by the PMP.

Landlord Responsibilities – Landlord or Property Manager initial each point below:

_____ We will take your bed bug problem seriously and schedule a PMP visit as soon as possible.

_____ We will schedule inspections for adjacent units to assess the extent of the infestation. We will treat any infested units found.

_____ We will pre-inspect on the afternoon before the day of treatment to make sure your unit is properly prepared. We will let you know if anything is not ready.

_____ We will offer bed-bug proof mattress and box spring encasements for you to purchase. If needed, we can arrange a monthly installment plan to enable you to pay for the encasements over time.

_____ We will help the pest management professional get access to cracks and pipe chases for treatment.

_____ We will make any structural repairs necessary to eliminate bed bug hiding places. We will caulk or seal any cracks and crevices in the unit.

_____ We will schedule follow-up treatments for your unit as necessary.

Treatment scheduled for ___/___/____, by _____
Treatment by the PMP may take several hours.

I have read the above agreement and understand my responsibilities as set forth herein, and agree to abide by the terms of the Agreement as outlined above.

_____ _____
Resident Date

_____ _____
Resident Date

_____ _____
Landlord or Property Manager Date

C - Pre-Treatment Preparation Checklist

It is imperative that a homeowner or tenant follow a pre-treatment checklist prior to the arrival of the pest management professional (PMP). Not preparing the infested room or unit greatly diminishes the ability of the PMP to correct the problem and the results will be compromised. The following is an example checklist for preparing a room or unit for treatment:

- ☐ Remove all bed linens, pillowcases, bed pads, curtains, clothing, and furniture dressings. Place in large sealed bags, and take to the laundry facility to be washed and dried.
- ☐ Wash these linens in hot water with temperatures above 120°F. Dry them using the hottest cycle available, and then place them in clean bags and seal. Remember to never place the clean clothing or bed sheets into used plastic bags, always use fresh and new plastic bags.
- ☐ Mattresses must be removed from bed frames and box springs and stood straight up. Headboards should also be removed from wall. Box springs should also be stood straight up.
- ☐ Empty closets, bedside tables and bureau drawers for inspection and treatment and place items in clean clear plastic bags that close tightly.
- ☐ Make sure the room perimeter is accessible for inspection and treatment. Remove anything that could be in the PMP's way, and move furniture away from the walls.
- ☐ Remove picture frames, clocks, posters and other wall hangings for inspection and treatment.
- ☐ Pick up everything from the floor that could be considered an obstacle, especially in rooms where bed bugs are present or suspected to be. Check each item thoroughly before putting into a bin or bag.
- ☐ Make sure locked rooms and closets are left open for inspection and treatment.
- ☐ Remove all electrical outlet and light switch plates. Remove wall mounted lights if applicable. Reinstall 24 hours after completion of treatment.

D - Sample Bed Bug Complaint Documentation Form for Hotels

Document the complaint:

Date and Time: _____

Hotel employee taking complaint: _____

Guest Name: _____

Guest room number: _____

Guest contact phone number: _____

Complaint: _____

_____

_____

Actions to take in reponse:

1. Offer guest a different room (must not be directly above, below, or beside previous room).

   Guest accepted? Yes No

   New room number: _____

2. Put room out of service and prevent any hotel staff from entering until room has been inspected.

3. Call pest control company to schedule inspection.

   Pest control company name & phone number:

   Date and time contacted:

   Inspection scheduled for:

4. Have a manager contact the guest to discuss their concerns.

   Manager's name:

   Date and time guest contacted:

   Compensation (if any) offered:

5. Once room has been inspected, keep a copy of the inspection report for hotel's records and inform guest of the inspection results.

   Inspection found evidence of bed bugs? Yes No

   Date and time guest contacted:

   Compensation (if any) offered:

Bed Bugs: What Schools Need to Know

Recently, Michigan and other states have seen an increased number of bed bug infestations plaguing residents. As bed bugs infest more and more homes, they may find their way into schools. When this happens, the school needs to take proactive action to prevent infestation and stop them from spreading in the school setting.

What are bed bugs?

Bed bugs are small, brownish, flattened insects that feed on the blood of people while they sleep. Although the bite does not hurt at the time, it may develop into an itchy welt similar to a mosquito bite. Bed bugs do not transmit disease, but they can cause significant itchiness, anxiety, and sleeplessness. Bed bug infestations are also very difficult and expensive to control.

Usually, bed bugs will hide during the day and only come out to feed during the night. Unlike head lice, they do not live on a person. However, they can hitchhike from one place to another in backpacks, clothing, luggage, books, and other items.

Could my classroom be infested?

Actual bed bug infestations in schools are uncommon. More commonly, a few bed bugs will hitchhike to school from an infested home by hiding in a student's clothing or backpack. Bed bugs that hitch a ride into the school in one student's backpack could be carried home by another student, making the school a potential hub for bed bug spread. This is not a minor concern – bed bugs are very expensive and difficult to eradicate.

If a school plans to use pesticides to control pests indoors, then they are required under Michigan law to have an **integrated pest management (IPM)** plan in place. If a bed bug infestation is suspected or a number of students are getting bitten during class, the school should contact a **licensed pest management professional** for assistance.

This fact sheet has been published by the Michigan Bed Bug Working Group (Update May 2010).

What if I find a bed bug on a student?

If a bed bug is found on a student, it may indicate that the student has bed bugs at home. However, bed bugs can crawl onto or off of a person (or their belongings) at any time, so it is also possible that the bed bug was brought to school by someone else. If a suspected bed bug is found on a student or a student's belongings, the following procedures should be followed:

- The student should be discreetly removed from the classroom so that the school nurse or a qualified individual can examine the student's clothing and other belongings. Any bugs found should be removed and collected for identification. Try to keep the specimens as intact as possible.
- If a confirmed bed bug was found on a student, then the school principal or nurse should contact the student's parents or guardian to inform them of the bed bug presence on their child. Consider sending a bed bug inspection form home, a sample is provided at the end of this document. Educational materials, such as those available at http://www.michigan.gov/bedbugs should also be provided to the family.
- The school principal or nurse or center program director should consider notifying the affected class or classes. A sample notification letter is provided at the end of this document.
- Students should not be excluded from school due to bed bugs unless repeated efforts have been made to remedy an infestation. Schools should not be closed due to bed bug presence, if pest management is necessary it will normally be targeted to certain areas of the school.
- Ongoing pest management that includes the use of pesticides indoors should be overseen by the school principal or designee and must conform to the school's integrated pest management plan, as required by Michigan law (MCL 324.8316).

What can I do to eliminate bed bugs from my classroom?

- DO NOT allow untrained staff to apply pesticides on school property. By law, only IPM trained applicators can apply pesticides (even ready-to-use products like sprays) in schools, and in compliance with the school's IPM plan.
- 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 by a pest management professional or other trained staff.

What if one of my students has an infestation at home?

When a student is dealing with an infestation at home, it is important to be sensitive to their problem. Although bed bugs have nothing to do with cleanliness or socioeconomic status, 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 reference the online resources at: http://www.michigan.gov/bedbugs.
- 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.

Additional Resources

- Michigan Bed Bug Resources
  http://www.michigan.gov/bedbugs
- Central Ohio Bed Bug Task Force
  http://centralohiobedbugs.org/
- Model IPM Plan for Michigan Schools
  http://www.michigan.gov/documents/mda_A_Model_Integrated_Pest_Management_Policy_for_Michigan_Schools4_130114_7.pdf

Bed bug images provided by U.S. Centers for Disease Control and Prevention

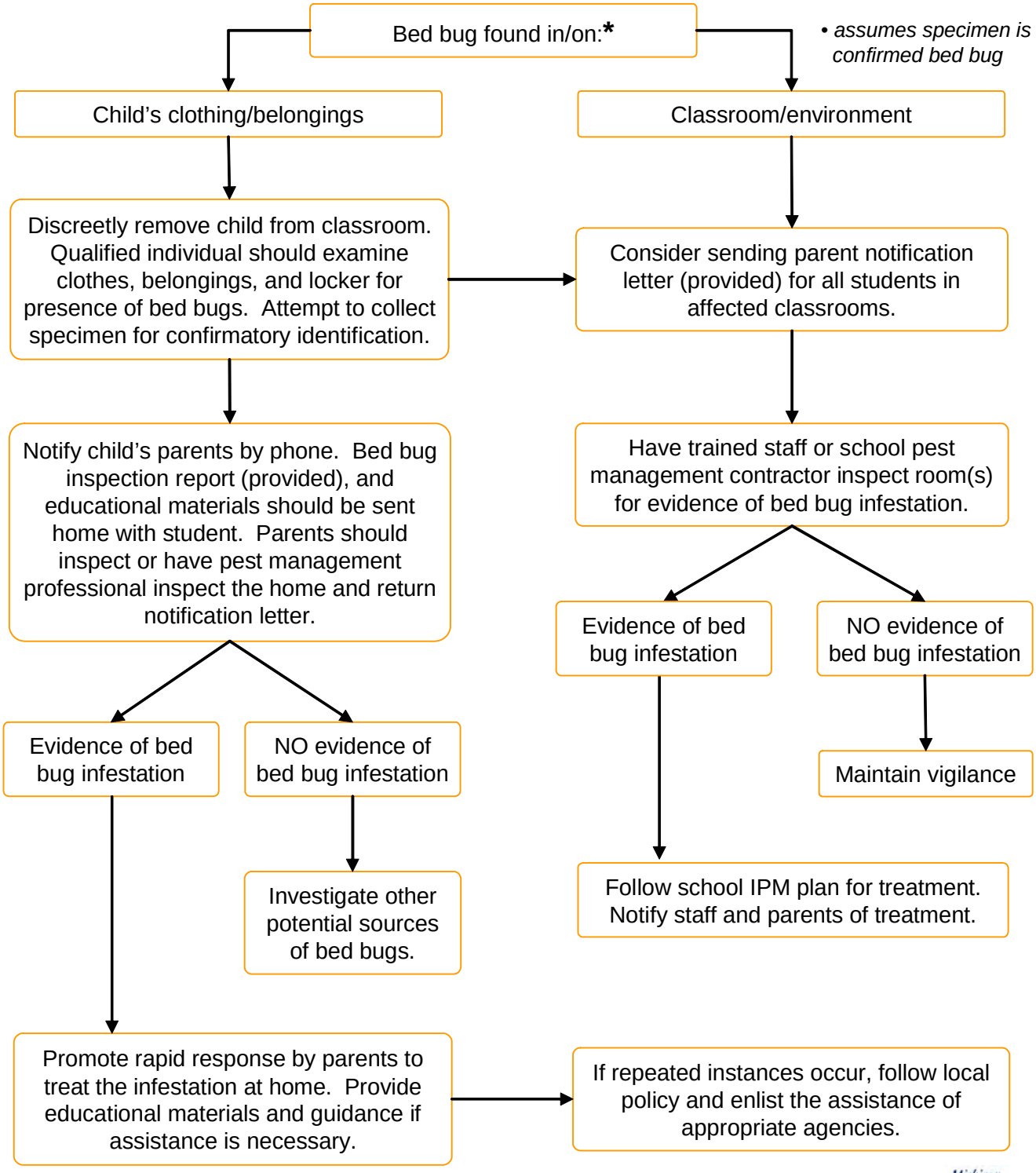
Bed bug bite image provided by University of Sydney Department of Medical Entomology

Bed bugs in baseboard image provided by Ohio State University Extension Entomology

Michigan Bed Bug Working Group (May 2010)

Bed Bugs: School Response Flowchart

School Responsibility:
Providing a healthy, pest-free environment in which students can excel
Parent/Caregiver Responsibility:
Providing a safe and healthy living environment for the student



See the Schools and Daycares section of Michigan's Bed Bug Prevention and Control Manual for detailed instructions.

F - Sample Parent Notification Letter for Schools and Child Care Centers

Dear Parent or Guardian:

We recently found a bed bug in your child's classroom. Bed bugs are a nuisance, but their bites are not known to spread disease. Bed bugs are usually active at night and feed on human blood. The bite does not hurt at first, but it may become swollen and itch, much like a mosquito bite. Watch for clusters of bites, usually in a line, on exposed areas of the body. If you have concerns for you or your child, please contact your doctor.

The source of bed bugs often cannot be determined, as bed bugs may be found in many places including hotels, planes, and movie theaters. Even though it is unlikely for bed bugs to be spread in _____(schools or child care centers), _____ (add your school district/child care center here) will conduct an inspection and, if needed, will treat the area where the bed bug was found.

_____ (add your school district/child care center here) will continue to work to identify bed bugs, provide thorough inspections of _____ (schools or the child care center), and have licensed pest control specialists treat the rooms if a problem is found.

Contact your physician or school nurse for proper care and treatment of bed bug bites.

If you have any questions regarding bed bugs in your ____ (school or child care center), please contact the _____ (principal or school nurse or program director). If you have any questions regarding bed bugs found in your home, refer to _____

Sincerely.

School Nurse
(If one is available)

Or

Program Director

Principal

G - Sample "Parent Bed Bug Inspection Report" for Schools

Dear Parent,

Today, a bed bug was found on your child or in your child's belongings. While this does not necessarily mean that the bed bug was brought to school by your child, it is important to your child's health and to the school community that you inspect your home for signs of bed bugs.

Enclosed you will find information about bed bugs and an identification guide to help you with your inspection. Once you have inspected your home, please fill out the form below and return to the school office by _____.

Sincerely,

School Administration

I have been informed that a bed bug was found on my child at school. I understand that bed bugs pose a threat to my child's well-being and to the greater school community. I have read and understood the educational materials provided to me regarding bed bugs, and have:

- ☐ carefully checked my family and home for signs of bed bug infestation myself
- ☐ hired a pest management professional to check my family and home for signs of bed bug infestation. Name of pest control company: _____

After completing a careful inspection, I certify that to the best of my knowledge:

- ☐ I or a pest management professional found signs of bed bugs in my home, and I will take the following actions to eliminate this infestation:
  _____
  _____
  _____
  _____
  _____
- ☐ I or a pest management professional did not find signs of bed bugs in my home at this time. If I find evidence of bed bugs in the future, I will notify the school immediately and take action to address the infestation.

I understand that bed bugs can be spread to other homes if they are brought to school in backpacks, clothing, and other belongings. I understand that if bed bugs are repeatedly found on my child, that the school may take additional actions to protect the school community from bed bugs.

Signature _____ Date_____

Pest management professional's signature_____

H - Recordkeeping Requirements for Licensed Pest Management Firms and Certified Commercial Pesticide Applicators in Michigan

Checklist of Pesticide Application Record requirements and Customer Receipt requirements

Commercial Applicator Record requirements: Regulation 636 Rule 15

Element Present? Yes or No	Required Elements of Firm Records if your firm or building staff apply any pesticides.
	Brand name of product; 15(2)(a)
	EPA Registration Number of product;15 (2)(a)
	Concentration of pesticide applied; 15 (2)(b) example: 2 fl oz per 5 gal H2O, not applicable to premixed, granular
	Amount of pesticide end use dilution; 15 (2)(c) example: 48 gal (product + carrier)
	The target pest, purpose, or crop site; 15(2)(d)
	The date the pesticide was applied; 15(2)(e)
	The address or location of the pesticide application;15(2)(f)
	The method of application; 15(2)(g) example: spreader, duster, etc.
	The rate of application; 15(2)(g) example: 6 lbs per 5000 sq ft, to run-off
	Records maintained at least 1 year following application of general use product; 15(2)
	Records maintained at least 3 years following application of restricted use product; 15(1)

Applicator Service Agreement (Customer Receipt Requirements): Regulation 637 Rule 12

Element Present? Yes or No	Required Elements of a customer receipt when a firm applies pesticides for hire. This must be provided to the building management or the customer.
	The name of the firm; Rule 12(2)(a)
	The address of the firm; Rule 12(2)(a)
	The telephone number of the firm; Rule 12(2)(a)
	The full name of the applicator who provides the service; Rule 12(2)(b)
	A general description of the target pest(s); Rule 12(2)(c)
	Common name of active ingredient; Rule 12(2)(d)
	Time of application; Rule 12(2)(e)
	Date of application; Rule 12(2)(e)
	Precautionary warnings which are pertinent; 12(2)(f)
	Information provided (a) not later than at the time of each pesticide application OR (b) electronically within 48 hours with written approval prior to application; Rule 12(3)

Contact the Michigan Department of Agriculture with any questions regarding pesticide laws and regulations:
1-800-292-3939 or visit www.michigan.gov/mda

Regulations cited above:

R 285.636.15 Commercial applicator records.

Rule 15. (1) All commercial applicators shall maintain verifiable records of restricted-use pesticide applications for a period of not less than 3 years following the application. The records shall show all of the following information:

(a) The name and EPA registration number of the pesticide applied.
(b) Concentration of the pesticide applied.
(c) The amount of pesticide end use dilution applied.
(d) The target pest, purpose, or crop site.
(e) The date the pesticide was applied.
(f) The address or location of pesticide application.
(g) The method and the rate of application.

(2) All commercial applicators shall maintain verifiable records of general-use pesticide applications for a period of not less than 1 year following the application. Such records shall show all of the following information:

(a) The name and EPA registration number of the pesticide applied.
(b) The concentration of the pesticide applied.
(c) The amount of pesticide end use dilution applied.
(d) The target pest, purpose, or crop site.
(e) The date the pesticide was applied.
(f) The address or location of pesticide application.
(g) The method and the rate of application.

(3) It is the responsibility of the employer of the commercial applicator to maintain the verifiable record at the place of business. The application records shall be made available, upon request, to an authorized representative of the director during normal business hours.

R 285.637.12 Applicator service agreements.

Rule 12. (1) Before applying a pesticide, a commercial applicator who is required to be licensed by the act, or his or her authorized agent, shall enter into an oral or written service agreement with the customer or authorized agent. The agreement shall specify all of the following:

(a) The customer's consent to services.
(b) The name, address, and telephone number of the firm that provides the pesticide application services.
(c) The approximate schedule, frequency, and duration of anticipated services.

(2) A commercial applicator who is required to be licensed by the act, or his or her authorized agent, shall provide all of the following written information to the customer or to the customer's authorized agent:

(a) The name, address, and telephone number of the firm that provides the pesticide application services.
(b) The full name of the applicator who provides services.
(c) A general description of the target pest or pests to be controlled.
(d) A list of the pesticides applied, including the common name of the active ingredient.
(e) The time and date of the application.
(f) Applicable precautionary warnings or reentry restrictions which appear on the label of the pesticide or pesticides that are applied.

(3) The information required in subrule (2) of this rule shall be provided in one of two ways:

(a) Not later than at the time of each pesticide application.
(b) The information may be provided electronically within 48 hours after the application if the commercial applicator has the written approval of the customer or the customer's authorized agent prior to the application.

(4) Not later than at the time of initial pesticide application, a commercial applicator who is required to be licensed by the act, or his or her authorized agent, shall provide all of the following written risk and benefit information to the customer or the customer's authorized agent:

(a) The definition of a pesticide.

(b) A general description of how pesticides work.

(c) Why pesticides are used.

(d) General toxicity information related to all of the following:

(i) The type of compound used.

(ii) The environment in which the pesticide is applied.

(iii) General exposure information.

(iv) The amount or rate of pesticide applied.

(v) Proper pesticide applications in compliance with the label.

(e) Common sense precautionary measures for the customer regarding pesticides.

(f) General information on the environmental fate of pesticides.

(g) Instructions to the customer to discuss site preparation and precautionary measures with the pesticide applicator.

(h) Instructions to the customer to consult with a physician if an unusual reaction occurs.

(5) A commercial agricultural or aerial applicator may provide the information specified in both of the following provisions to the customer or the customer's authorized agent in place of the information requirements specified in subrules (2) and (3) of this rule:

(a) Oral instructions to the customer or the customer's authorized agent on labeled reentry and preharvest interval requirements before application.

(b) A copy of the risk and benefit information sheet or the pertinent section of the label that pertains to risks and benefits.

(6) If an emergency requires immediate pesticide application, the information that is required in subrule (2) of this rule may be provided after the application has occurred.

(7) The department reserves the right to review and prohibit the use of written information required to be provided to customers in subrule (3) of this rule if the director determines that the information does not meet the intent of subrule (3) of this rule.

(8) The duration of a service agreement shall not be more than 12 months unless either written notification of continuation of service is provided annually or unless the service agreement is a signed contract that specifies a definite time period during which the contract is valid. Written notification of continuation of service shall provide information to the customer regarding how to discontinue service.

(9) When requested by the customer or his or her authorized agent, the commercial applicator shall provide all of the following documents to the customer:

(a) Product labels.

(b) Material safety data sheets.

(c) Environmental protection agency fact sheets, if available.

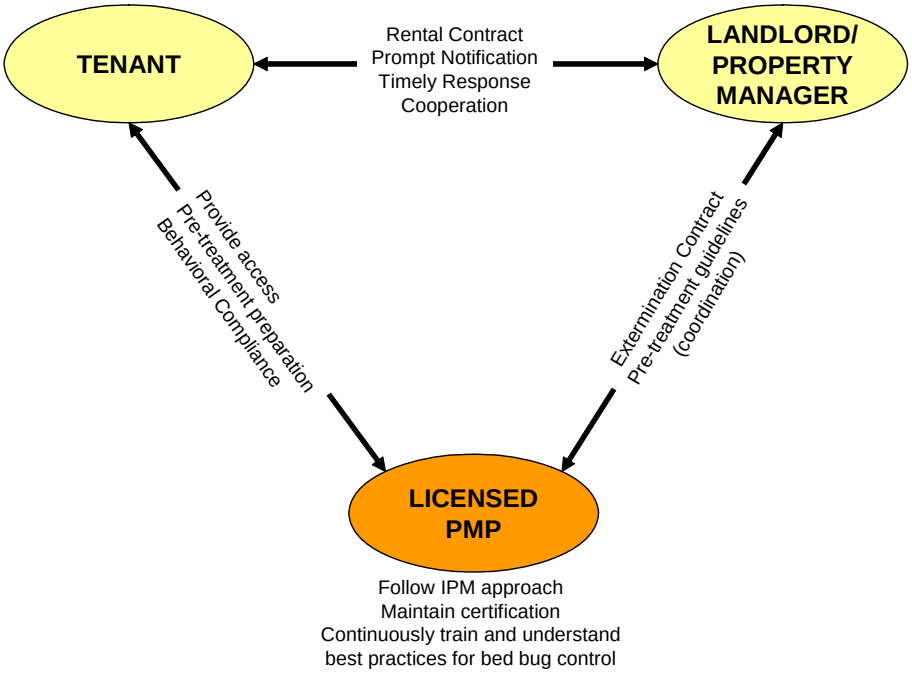
(d) A document that specifies the rate of application of the active ingredients of the products applied.

(10) If the customer is acting in the interest of residents of the treated premises, then the customer shall make the information provided in this rule available to the residents upon request.

I - Agency and Public Roles for Successful Bed Bug Management

State and local agencies will often receive calls from concerned citizens, homeowners, renters, landlords, and facility managers regarding bed bug management and control. It is important that local agencies understand their respective role in bed bug management and coordinate responses to help minimize infestations in the community. For example, if a bed bug complaint arises in a licensed, multi-unit rental regarding a tenant/landlord dispute; the primary regulatory authority will most often be the local housing authority or code enforcement agency. The initial complaint, however, may be made to the local health department, which can provide education about bed bug control, and advise about options for resolution of the dispute. These options will often include housing code officials, state regulatory agencies, social services agencies, etc. When enforcement actions are necessary, this is most often coordinated through the local prosecutor's office.

Ultimately, however, the responsibility for bed bug management rests with the individual(s) or agency responsible for the property. A coordinated response is the only way that true bed bug management can be achieved. The figure below illustrates a three-point, coordinated response model, which includes the affected individual, the property manager or landlord, and the pest management professional. Each corner of this "Triad" has certain responsibilities that must be met for bed bug management to be successful.



Moving from the individual responsibilities outlined in the "triad", there is a network of State and local agencies that may play a role in bed bug management as follows:

Local Health Department/Michigan Department of Community Health (LHD/DCH)

- Receive BB complaints from public
- Provide information on health effects, prevention of BB
- Refer BB complainant to proper agency
- Investigate complaints involving health care facilities
- Enforcement of Public Health Code

Local Prosecutor

- Work with county agencies to enforce local and state housing and public health laws

Tenant

- Promptly report BB infestation to landlord
- Cooperate with landlord and Licensed Pest Management Professional (PMP) instruction
- Follow prevention and control instructions for personal belongings
- If you move, do not take BB's with you to a new location

Pest Management Professional (PMP)

- Obtain MDA business license
- Employ certified pesticide applicators
- Follow nationally accepted protocols for BB treatment of infested premises
- Educate landlord/tenant about their role in successful BB pre/post treatment and prevention

Michigan State Housing Development Authority (MSHDA)

- Funding for homeless shelters
- Oversees HUD/Section 8 program for thousands of Michigan residents

Local Housing Authority or Code Enforcement Office

- Receive BB complaints
- Provide timely response or inspection
- Enforce local housing codes & HQS
- Develop work plans for BB mitigation
- Certify compliance
- Refer BB complainant to appropriate additional agencies if necessary

Landlord or Property Manager

- Provide safe and sanitary housing
- Timely response to tenant BB complaints
- Contract with Licensed Pest Management Professional for BB Treatment
- Provide PMP access to infested and surrounding units
- Cooperate with PMP
- Utilize power of the lease to gain tenant compliance with BB treatment protocol

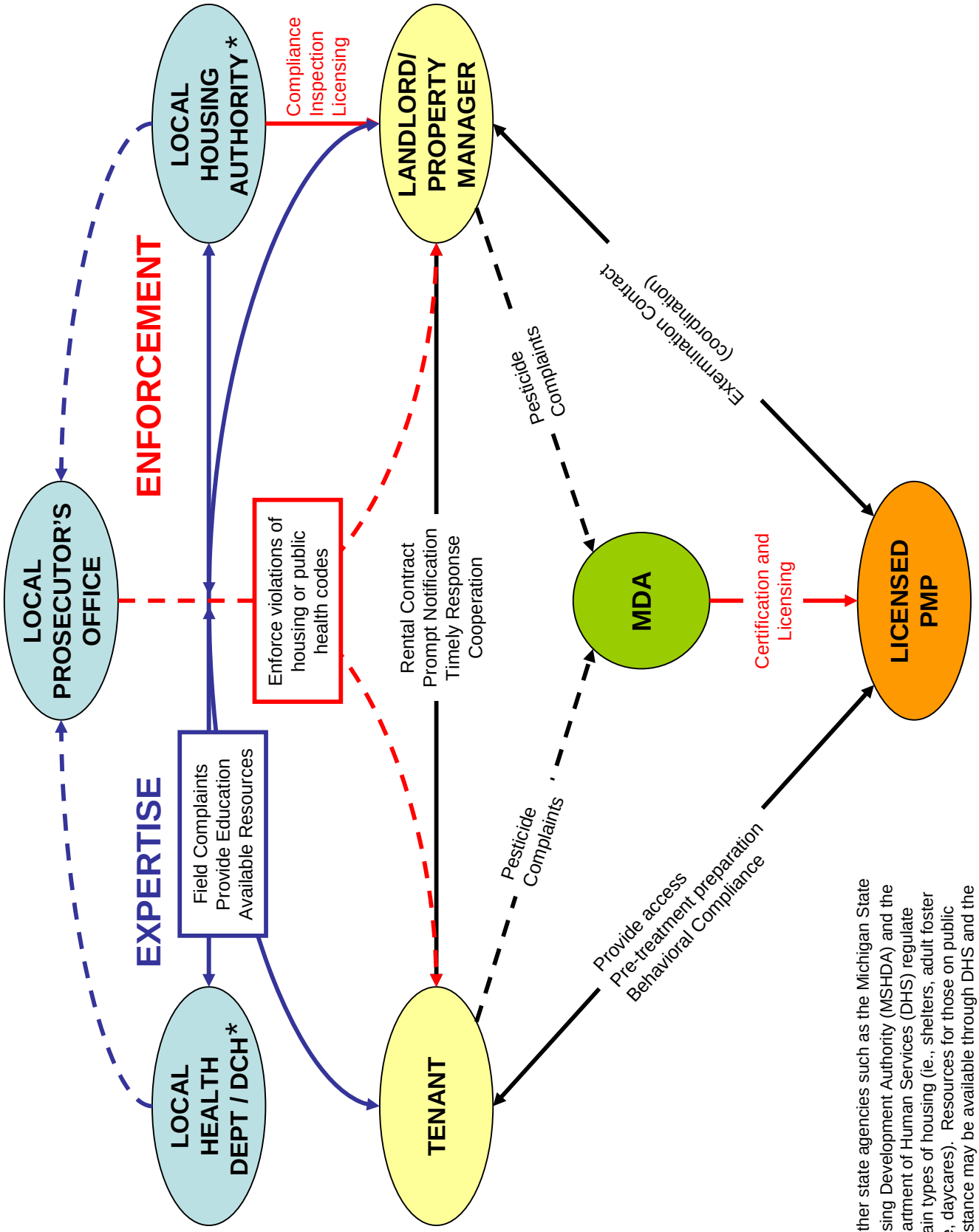
Michigan Department of Agriculture (MDA)

- Certify Michigan Pest Management Professionals and license businesses applying pesticides in the state
- Enforce state and federal pesticide safety laws
- Respond to pesticide related complaints

Michigan Department of Human Services (DHS)

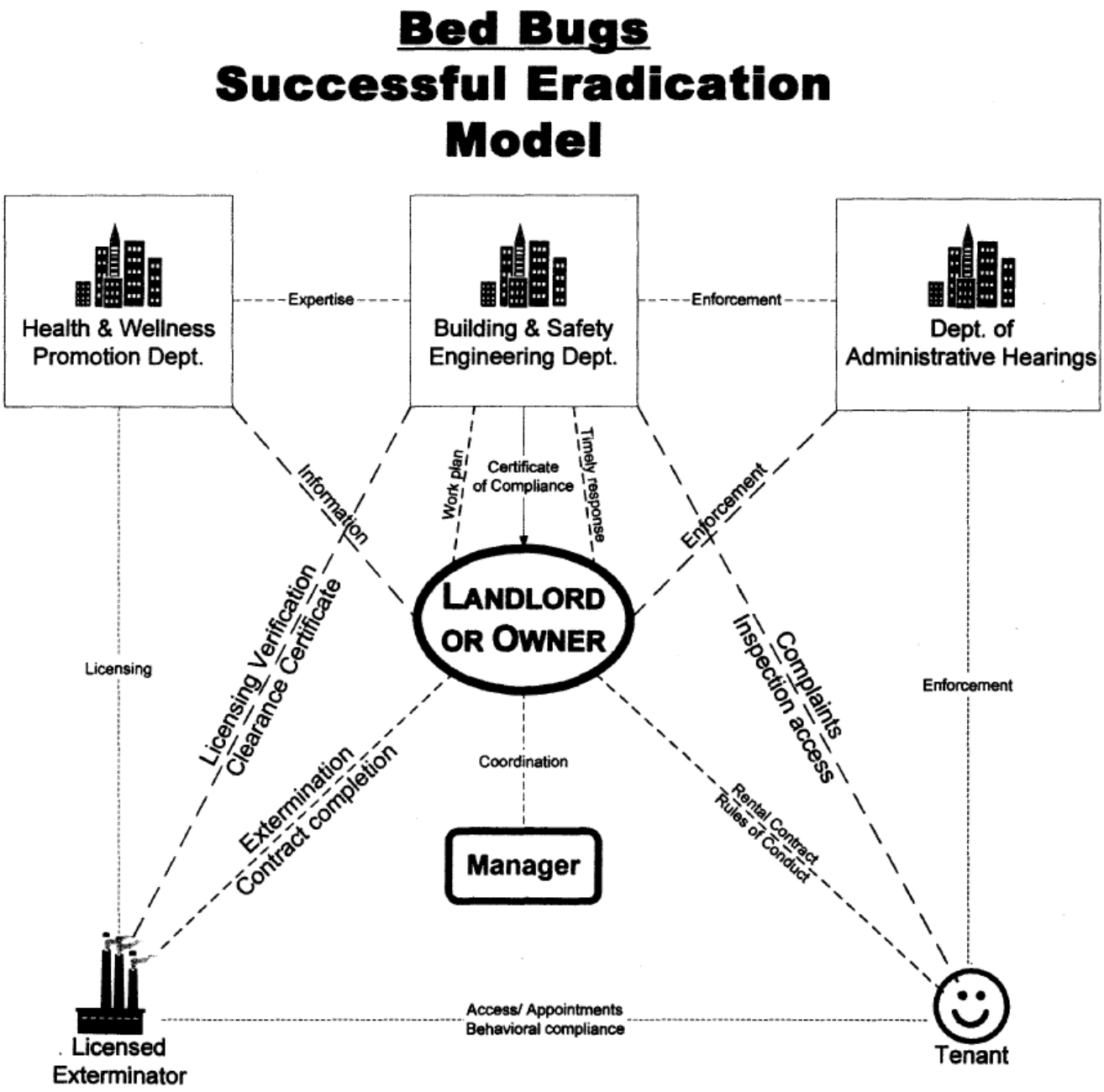
- License and regulate certain types of special housing (child care, adult foster care, camps, and others)
- May provide economic assistance to citizens through state emergency relief funds

The following figure combines potential players in a community bed bug response, including the individual "triad" concept, and the supporting regulatory agencies. This model is an example, and can be adapted to local needs.



* Other state agencies such as the Michigan State Housing Development Authority (MSHDA) and the Department of Human Services (DHS) regulate certain types of housing (ie., shelters, adult foster care, daycares). Resources for those on public assistance may be available through DHS and the State Emergency Relief program.

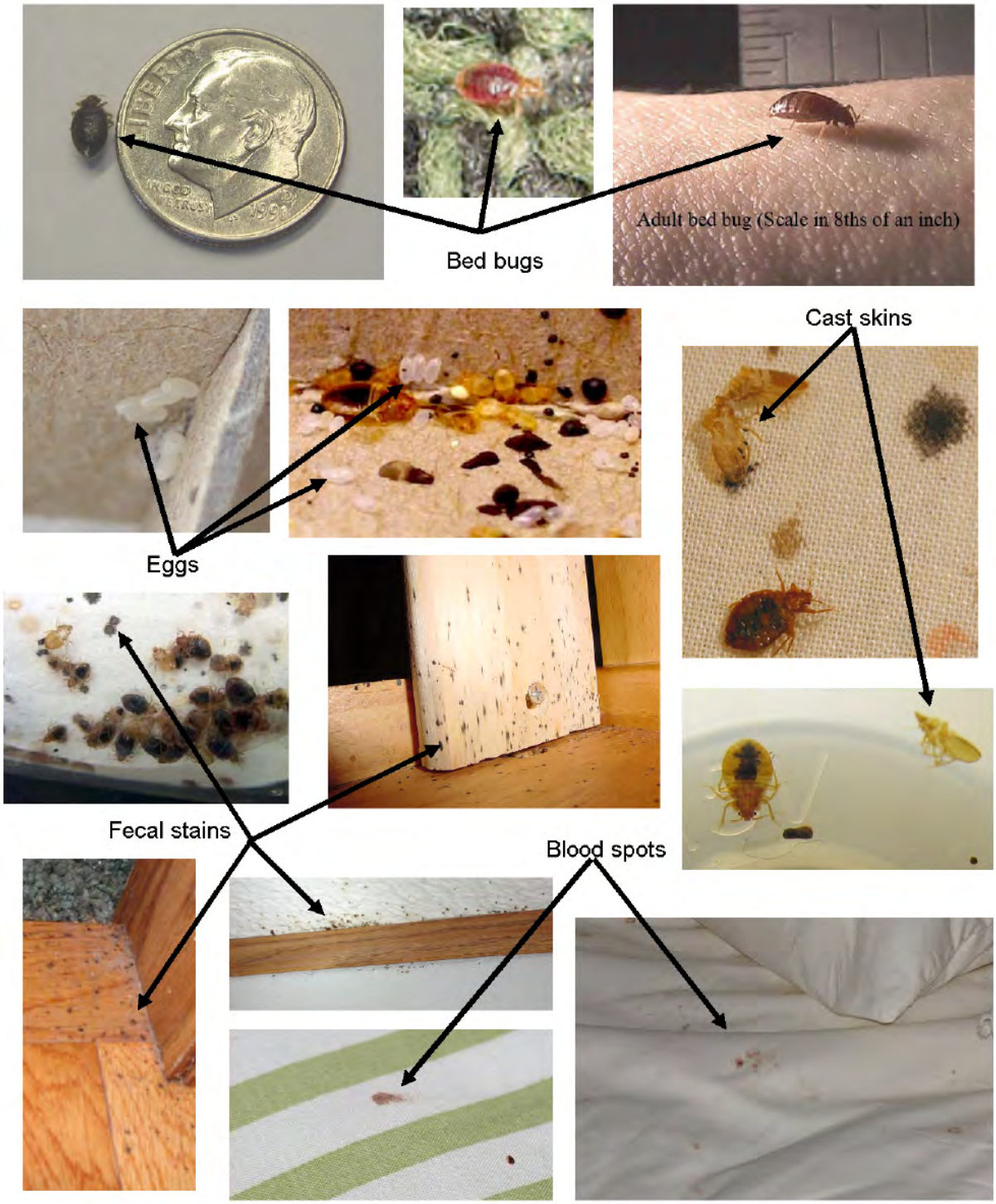
Below is an example of a bed bug eradication model adopted by one of Michigan's major metropolitan areas:



For more information about agency roles and responsibilities at the State and local level, please review the Matrix of Michigan Laws and Regulations section of this manual.

J - Bed Bug Identification Guide

Look for live or dead bed bugs, eggs, cast skins, fecal stains and blood spots.



How to Move and Leave Bed Bugs Behind

If you think that moving will automatically eliminate your bed bug problem, *think again!*

Unless you take the right precautions, your bed bugs are likely to move with you, causing more trouble in your new living space. However, if you must move to a new home before your bed bug infestation has been eliminated, you can take these measures to avoid bringing bed bugs with you:

Packing:

- Place all belongings in clear plastic bags and seal tightly. Sort items by type (clothes, towels, sheets and blankets) and keep things that are known to be infested away from clean items.
- Wash and dry all fabric items on the hottest recommended setting and then seal them in clear plastic bags labeled "Clean".
- Put items that cannot be sanitized inside sealed clear plastic bags (electronics, appliances, books, etc.) and ask a pest management professional how these items should be treated.
- Purchase bed bug proof mattress covers for the beds of each member of the household. Also cover box springs.
- If you decide to throw away infested furniture or mattresses, wrap them in plastic and clearly paint or write "Bed Bugs" on them, so neighbors won't bring the items into their homes. You may want to go even further and physically slash or destroy the items as well.

Moving Day:

- Have each person shower and change into clean clothing and shoes and bag up the current (possibly infested) clothes for laundering.
- Give pets a bath to ensure that they are bed bug free before taking them to your new home.
- All furniture should be sanitized. Furniture such as night stands and bookshelves can be most effectively sanitized and treated when they are empty. If you are moving furniture items that may be infested, you should first remove and pack the contents of the furniture. The empty furniture should then be treated by a licensed pest management professional before moving into your new residence.

Unpacking:

- Before personal belongings can be accessed in the new home, they MUST be bed bug free, or the new home will likely become infested as well.
- Launder any items not labeled "Clean" before using.
- If you acquire any new or used furniture, inspect it carefully before bringing it into your home to make sure it is bug free.
- Educate yourself about bed bugs and what to look for using fact sheets from http://www.michigan.gov/emergingdiseases
- Contact your building manager immediately if you notice any signs of bed bugs in your new home. The earlier an infestation is detected, the easier it will be to treat.

This fact sheet has been published by the Michigan Bed Bug Working Group (July 2009) and adapted from materials provided by J.L. Gangloff-Kaufmann and C. Pichler, New York State IPM Program, Cornell University

L - Sample Resident Letter for Dormitories

Dear Student/University housing resident:

You are receiving this letter because you or residents of neighboring units suspect a bed bug infestation in the dorm or apartment complex. You will be contacted soon by housing or pest control agency staff in order to arrange an inspection and possible treatment of your unit. Do not be alarmed – the infestation may not yet be confirmed and, though the problem is unpleasant, bed bugs present no serious health risks. Please read the following information and take the recommended steps to reduce the risk of spreading the insects. We also encourage you to visit the Michigan Department of Community Health Website (http://www.michigan.gov/bedbugs) for more details about bed bugs and their control.

Background Information about Bed Bugs:

- Bed bugs have re-emerged as a pest in the United States and are now spreading in hotels, apartments, college residence halls, health care facilities, child care centers, and even office buildings throughout the country.
- Bed bugs are not a sign of bad sanitation, any home can become infested regardless how dirty or clean it is.
- Bed bugs must be introduced into a dwelling and do not fly, jump, or live on people.
- Bed bugs feed on the blood of humans, but they have not been shown to be capable of transmitting any diseases.
- Control of bed bugs requires patience and cooperation, along with a diligent management program implemented by a pest management professional.

Detection of Bed Bugs:

- Early detection of bed bugs is very important and will greatly facilitate the ability of pest management professionals to gain control in an efficient manner.
- Waking up each morning with bites that were not present the night before is an indication that bed bugs may be present. Bites can occur anywhere on the body, but are most prevalent on the upper body (arms, shoulders, and neck) or lower body (calf area). Not all people react to bed bug bites, but for many people, the bites will appear as a welt or rash and will often occur in rows of two or three. If you notice unexplained bite marks, you may want to consider contacting your campus housing office.
- In heavy infestations, bed bugs may be seen actively crawling in the room, particularly during the evening hours or when the room is dimly lit. Adult bed bugs are about 3/16-inch long and 1/8-inch wide and are reddish brown in color after feeding. Immature bed bugs are much smaller (newly emerged bed bugs are only 1mm in length) and tend to be pale in color.
- Blood stains or smears on sheets, pillowcases, or along the edges/corners of mattresses are another sign that bed bugs may be present. They are typically a tar black color.

Service Call Criteria:

Our service, based upon our findings, may consider the employment of one or more of the following control measures:

- Basic or Intensive inspection of visible evidence of bed bugs or related obvious signs with recommendation.
- Physical removal of visible bed bugs and eggs with a vacuum.
- Physical destruction of bed bugs and eggs using steam or other non-chemical treatments.
- Encasement of mattresses to aid in future inspections and limit the number of areas that bed bugs can hide on the mattress. Application of target specific pesticides when and where appropriate.

What You Should Expect:

Bed bugs and their eggs may be located in areas that are inaccessible during treatment. Over the days and weeks following the initial treatment eggs may continue to hatch and bugs emerge from concealed hiding places. A follow-up program will be in place to address the continued activity, however, due to the nature of the biology and behavior of bed bugs it is not unusual to expect the following:

- You may see an increase in bed bug activity a few days following treatment as the population has been disturbed and hiding places are eliminated.
- Bed bugs may be noticed between treatments, but their abundance will rapidly diminish with treatments.
- You may continue to experience some bites until all bugs have been eliminated.
- Elimination of the problem may not be achieved for 45 days depending on the treatment regime used.

What Not to Do:

- Do not throw away items or remove them from your room, it may spread the problem. Consult with your housing authority representative or pest control expert on how to handle potentially infested items such as mattresses, box springs, and furniture.
- Do not attempt to control bed bugs on your own, leave it to the experts.
- Do not change your sleeping location, this is not a solution and may spread the problem.
- Do not use any pesticides in your room.

What You Can Do to Help:

- Clean up clothes and general clutter throughout the room. This removes bed bug hiding places and is important in containing the problem.
- Launder the items that can be bagged. A hot wash and hot dry cycle for at least 30 minutes will kill all stages of bed bugs.

(adapted from materials provided by Rutgers University)

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IMAGE CREDITS

Page	Image Description	Image Credit
Front Cover	Bed Bug Image	Graham Snodgrass, US Army Public Health Command
Back Cover	PMPs at work	M. Sheperdigian - Rose Pest Solutions
Page 3	Adult bed bug side view	Centers for Disease Control and Prevention, Public Health Image Library (CDC PHIL)
Page 4	Bed bug life cycle	Stephen Doggett, Department of Medical Entomology, ICPMR, Australia
Page 4	Fed vs. unfed bed bug	Jeff Hahn, Univ. of Minnesota Extension
Page 5	Adult bed bug top view	Jeff Hahn, Univ. of Minnesota Extension
Page 6	Bed bug bites	Stephen Doggett, Department of Medical Entomology, ICPMR, Australia
Page 7	Clustered bed bugs	Stephen Doggett, Department of Medical Entomology, ICPMR, Australia
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Page 10	Head lice with match and penny	Pediculosis (Creative Commons)
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Page 11	Tick closeup	Andrew J. Brooks - CDC PHIL Image 7321
Page 11	Tick removal w tweezers	A. Arugay - LA County West Vector Control District
Page 11	Flea on skin	Michigan State University Extension
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Page 18	Hotel mattress for sale sign	M. Attenborough
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Page 25	Bed bug eggs	H. Harlan – Armed Forces Pest Management Board
Page 25	Fecal stains	M. Sheperdigian - Rose Pest Solutions
Page 25	Flashlight on wood	M. Sheperdigian - Rose Pest Solutions
Page 26	Mattress seam	M. Sheperdigian - Rose Pest Solutions
Page 26	Mattress seam with thumb	Stephen Doggett, Department of Medical Entomology, ICPMR, Australia
Page 26	Edge of box spring	M. Sheperdigian - Rose Pest Solutions
Page 26	Box spring inspection	M. Sheperdigian - Rose Pest Solutions
Page 27	Headboard groove	Lou Sorkin – American Museum of Natural History
Page 27	Bed frame	M. Sheperdigian - Rose Pest Solutions
Page 27	Bed bug inside wooden drawer	Lou Sorkin – American Museum of Natural History
Page 28	Screw hole	Lou Sorkin – American Museum of Natural History
Page 28	Sofa cushion	M. Sheperdigian - Rose Pest Solutions

Page	Image Description	Image Credit
Page 28	Bed bugs behind baseboards	Ohio State University Extension Entomology
Page 29	Inspecting behind switchplate	M. Sheperdigian - Rose Pest Solutions
Page 29	Bed bugs on popcorn ceiling	Michigan Dept of Community Health
Page 29	Books	Michigan Dept of Community Health
Page 30	Light fixture	Michigan Dept of Community Health
Page 31	Bed bug close-up	Sorkin & Mercurio - American Museum of Natural History
Page 33	Bed leg in glass bowl	Michigan Dept of Community Health
Page 33	Bed leg wrapped with double-sided tape	Public domain (Creative Commons)
Page 34	Vacuuming the bed	M. Sheperdigian - Rose Pest Solutions
Page 35	Items sealed in plastic bags	Michigan Dept of Community Health
Page 35	Pillow in the dryer	Michigan Dept of Community Health
Page 36	Vacuum HEPA filter	Michigan Dept of Community Health
Page 36	Knee-high stocking in vacuum hose	Michigan Dept of Community Health
Page 36	Upright vacuum	Michigan Dept of Community Health
Page 36	Canister vacuum	Che (Creative Commons)
Page 37	Vacuuming furniture crevices	M. Sheperdigian - Rose Pest Solutions
Page 38	Installing mattress encasements	copyright 2010, David P. James
Page 39	Gap around electrical outlet	Michigan Dept of Community Health
Page 39	Gap around pipe	Michigan Dept of Community Health
Page 39	Mattress marked "BED BUGS"	Rob Elliott - Swizzle Studio
Page 40	Steaming	M. Sheperdigian - Rose Pest Solutions
Page 41	Thermal treatment of kitchen	Michigan Dept of Community Health
Page 43	Pest management professional at work	M. Sheperdigian - Rose Pest Solutions
Page 43	PMP applying pesticides	M. Sheperdigian - Rose Pest Solutions
Page 44	Choosing a Pest Control Company	Michigan State University Extension
Page 106	Bed bug with dime	Michigan Dept of Community Health
Page 106	Bed bug on carpet	Ohio State University Extension Entomology
Page 106	Bed bug on arm with ruler	Jeff Hahn, Univ. of Minnesota Extension
Page 106	Bed bug eggs	H. Harlan – Armed Forces Pest Management Board
Page 106	Bed bugs with eggs and droppings	H. Harlan – Armed Forces Pest Management Board
Page 106	Cast skin on fabric	H. Harlan – Armed Forces Pest Management Board
Page 106	Bed bugs with fecal stains	Jeff Hahn, Univ. of Minnesota Extension
Page 106	Fecal stains on end of wood board	M. Sheperdigian - Rose Pest Solutions
Page 106	Bed bug and cast skin in clear dish	Verslinykas (Creative Commons)
Page 106	Fecal stains on wood floor	Michigan Dept of Community Health
Page 106	Fecal stains on popcorn ceiling	Michigan Dept of Community Health
Page 106	Blood spots on striped fabric	copyright 2010, David P. James
Page 106	Blood spots on white bedding	M. Sheperdigian - Rose Pest Solutions

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