Ultimate Hotelier's Guide to Bed Bugs

First Edition: August 2016

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August 2016

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I. An Introduction to the Bed Bug Problem

A. Why Have They Returned?

Bed bugs have been living with bats in caves throughout history. When humans also started to use caves, some bed bugs evolved to prefer humans as their source for a blood meal. And humans have been living with bed bugs ever since. The advent of a whole series of effective insecticides, starting with DDT in the 1950's reduced bed bugs to a minor pest in the modern world. Major advances in hygiene, better building practices and the introduction of the vacuum cleaner along with the washer and dryer also helped to reduce bed bug populations. Further. the relative limited ability of people to travel internationally throughout the world assisted to preserve the bed bug decline. Few Pest Management Professionals (PMPs) ever saw a bed bug until thereabouts 2000; almost 50 years from the time they were thought to be near eradicated.

What changed?

The biggest change was in foreign travel. Starting around the year 2000, bed bugs started to show up in the US. Researchers, looking at the genetics of bed bugs from various parts of the US, determined that bed bugs arrived in the US from many different countries in the world. Most of these bed bugs arrived came with built-in resistance to synthetic pyrethroid insecticides. In addition, few PMPs ever had to identify bed bugs much less try to control them. Few insecticidal products were labeled for the control of bed bugs thus options were severely limited.

Note: Globally, bed bugs were heavily resistant to DDT, which also conferred resistance to pyrethroid insecticides. Therefore, bed bugs arriving in the US were already resistant to this primary insecticide class used by most PMPs at the time. For purposes of definition, resistance means that the dose of insecticide typically used to control bed bugs was much less effective because the genetics of these bed bugs are capable of detoxifying the insecticide or preventing its penetration into the insect.

B. The Hotelier's Dilemma

The Scope of the Problem (based upon a 2015 Survey of PMP's) demonstrated that most PMP's (99.6%) have treated for bed bugs in the past year (2015).

The three types of structures in which PMP's repeatedly find bed bugs are:

Apartment/Condo's	95%
Single-family homes	93%
Hotels/Motels	75%

Of interest is the increase in bed bug infestation rates in other types of structures.

Structure	2013	2015
Nursing Homes	46%	58%
Office Buildings	36	45
Schools/Daycare	41	43
Hospitals	33	36
Doctor Offices/Outpatient	26	33
Transportation (train, bus, taxi)	21	29
Retail Stores	15	20
Movie Theaters	10	16

The point of the survey is that bed bug infestations continue to expand into all aspects of human society, which applies increasing pressure on hoteliers to vigilantly work toward maintaining a bed bug-free facility.

Bed bugs move about largely by hitchhiking on the possessions of humans. Bed bugs do not care anything about sanitation, social status, hotel quality, or any of the variables that humans would deem important. From a hotel standpoint, bed bugs have many entry points. They can come in with the luggage of the traveler. They can move from the taxi to the luggage. They can arrive in the backpack of the hotel staff who just used the subway or who brought them from home. They can even come by aircraft or bus and latch onto luggage or backpacks. In any event, hotels are highly vulnerable in that they may be challenged with a fresh wave of bed bug introductions every day.

Once at the hotel, bed bugs have carte blanche with respect to availability of blood meals, innumerable hiding places, often an untrained hotel staff and new guests all the time.

To combat this vulnerability, hotels need to prepare by having established procedures and by training their employees.

C. Scenario's to Prevent

The objective of this document is to prepare hoteliers to prevent or properly handle the following scenarios through the use of written procedures and training instructions that their staff can follow.

i. **Bed bug complaints being poorly handled by hotel staff**. This issue can result in complaints, compensation, lawsuits, and a prominent position

on one of the bed bug social media hotel web sites. This situation must be prevented through in-place procedures and training.

ii. **Bed bug(s) are presented by a guest to the Front Desk staff at 2 am**. The entire front desk staff must know how to handle this situation, and must do it with confidence and authority.

iii. **Housekeeping finds bed bugs during room cleaning**. This situation often can be handled without guest involvement. The staff should be congratulated for identifying the problem and then hotel policy and their contracted Pest Management Professional (PMP) should handle the situation from that point onward.

iv. **The hotelier hears complaints and comments from their staff concerning: bed bugs are in their home and claiming they came from the hotel; bed bugs are in the staff lockers; or, the staff is bringing bed bugs to the hotel.** The hotel should have a policy dealing with bed bug problems which center upon their staff. Ideally, when a staff member voices a complaint, the hotel directs the PMP to resolve it. Monitoring staff lockers has high merit but should also include other areas of the hotel, such as the hotel transport van and the area dedicated to guest luggage when temporarily stored. It is critical that hotel management clearly sends a message to the staff that 'together' they can resolve staff bed bug problems without fear of dismissal. Otherwise, staff will remain silent and bed bug issues will continue to manifest and expand.

v. **Checked-out guest calls to complain about bed bugs brought home or bites marks (welts) that just developed**. This is a difficult scenario as there are guests who will claim the presence of bed bugs to offset having to pay for their room stay, or more. This may be best dealt with on a case-by-case situation as it may require significant review to determine the actual veracity of the claim.

D. Factors that Increase Bed Bug Risk

i. The US transportation system in general is a very efficient means of moving people (guests and staff) and their belongings (and bed bugs) into hotels. The transportation system includes: aircraft, buses, cars, ships, taxis, and trains of all types. The transportation system moves both people and their infested belongings plus the elements of the system (e.g., seating) harbor bed bugs allowing for them to hitch a ride onto the next passenger.

ii. Hotel activities also influence the risk of bed bug infestation. Some hotels have a contract with the city to house displaced or homeless people. Other hotels, associated with theme parks or gambling

establishments, attract large numbers of people from all over the world. In certain areas, bed bug frequency is viewed with less alarm and therefore increase the likelihood of infesting baggage or belongings. Some smaller hotels may even cater to transient populations with low room rates and few amenities but endure higher risks for a bed bug infestation with scant budgets to resolve the problem.

iii. Hotel luggage storage areas offer a heightened opportunity for hitchhiking bed bugs to move to other luggage.

iv. Guest room design is very conducive for bed bug harborage. Bed skirts touch the floor offer easy access to bed bugs; complex headboards have many harborage spaces that are difficult to treat; pictures (and their nail hole attachment sites) adorn the wall above the bed and represent additional harborage; and, furnishings often contain dark colored fabric and wood making bed bugs hard to detect.

v. Uneducated housekeeping staff may not recognize the signs of bed bugs and may transport them between rooms via service carts and vacuum cleaners. Even worse, the staff may fail to locate/identify a bed bug before a guest discovers the pest.

vi. The establishment of 'Airbnb' (home sharing) in 2008 poses new problems for bed bug control. Home-sharing participants are not currently subject to the same sanitation and pest management practices as hotels thus bed bug issues, from both sides, may occur.

vii. According to a survey of PMP's, two thirds reported that summer traveling resulted in an increase in bed bug service calls.

viii. The cost of bed bug control over the years has been more and more difficult for the general public to manage. This is largely the result of several repeat insecticide applications being needed to obtain control because of extended bed bug egg hatch and because of the ease of re-infestation. Alternatively, heat treatment is significantly more expensive and even more difficult to finance.

Field research has indicated that bed bug infestations in low-income housing are particularly difficult to control. Some of the control difficulties are caused by: cost; apathy; immigration status; concern over housing management response; hoarding; unawareness of a bed bug infestation; re-infestation due to adjacent unit infestations; and, hitchhiking on the belongings of visitors.

Until a sustainable, cost effective bed bug control protocol can be developed and successfully administered by the management of these facilities, low-income housing will remain a primary repository of bed bugs in the United States for the

foreseeable future.

II. Understanding Bed Bugs

There are two important bed bug species in the world. The Common Bed Bug, *Cimex lectularius*, is the predominate species in the United States and the temperate areas of the world while the Tropical Bed Bug, *Cimex hemipterus*, occurs in more tropical areas. Both have very similar biology and behavior and only feed upon the blood of humans and their pets. There are also a host of other "bed bug type" insects that feed upon bats and birds and they may unsuccessfully attempt to feed upon humans and their pets if their food sources are removed. This discussion centers upon the Common Bed Bug.

A. Biology

i. General anatomic features

Bed bugs belong to the insect order Hemiptera (true bugs). They have a broad oval shape, are very flat when unfed and are wingless. Their mouthparts consist of a 3-segmented beak located on the underside of the body with which they insert and suck blood. Bed bugs are various shades of brown but can appear red when full of blood.

For this generation, bed bugs may be considered a new pest for PMPs to control. Complicating effective treatment includes the fact that the repertoire of insecticides available do not work well due to widespread pyrethroid insecticide resistance. In addition, another physical bed bug anomaly contributes to the control problem. Most insects have a sticky pad (arolium) located between the two claws on the end of each of their legs. This sticky pad allows insects, such as flies, to walk up a pane of glass. This sticky pad is also an entry point for insecticides when the bed bug walks across a treated surface. The problem is that bed bugs do not have sticky pads. This means that they are poor climbers (they prefer rough, tactile surfaces such as fabric and wood) but further, they do not pick up insecticides very well as they walk hindering effective control.

ii. Host Seeking

Bed bugs only feed upon blood. They prefer the blood of humans but will feed upon pets and other animals they come across. Long distance host location depends mostly upon the detection of CO_2. As the host becomes closer, host body heat and pheromones come into operation.

iii. Life Cycle

A bed bug egg hatches and a nymph emerges. The 5 progressive sizes (instars) of nymphs look like the adults except for size. An adult is approximately one-quarter inch long. The cylindrical shaped bed bug eggs are preferentially glued to a textured substrate (e.g., mattress, box spring, picture frame, backpack) individually though many eggs may be found close together. The eggs hatch in 7-10 days at room temperature. These nymphs require a blood meal before they can molt to the next larger size (5 sizes or instars will be found). Each molt results in a "shed skin" of the bed bug and is a sign of bed bug activity.

After feeding, bed bugs hide, close to the host in undisturbed locations, which in hotels likely means the box spring, headboard and bed skirt.

Areas nearby where bed bugs feed and harbor may exhibit black fecal spots and shed skins that are signs of bed bug activity. Bite marks cannot be used alone to document the presence of bed bugs.

Bed bugs can go a long time between meals. First instar nymphs die within 11 to 32 days without a blood meal but older nymphs and adults can last up to 143 days. If the temperatures are colder, they can live longer without a blood meal. It is difficult to outlast a bed bug in terms of feeding.

Bed bugs feed mainly at night, about once a week and each feeding takes 3-12 minutes. They may leave multiple, painless bites which typically manifest themselves as itchy welts, and which may appear almost immediately to over several days. It should be noted that 30 to 60% of the human population exhibits no response to bed bug bites but some people develop an ever-increasing skin response based upon allergic symptomology, which may result in severe allergic reaction or anaphylaxis. Scratching bites can result in infection.

Adult males and females mate in a process called "traumatic insemination'. The male simply punctures the female body with his copulatory organ and injects sperm directly into her body cavity. The sperm find their way to the female's eggs for fertilization. The female may lay approximately 3 eggs per day or from 200 to 500 eggs over her 6 to 18-month life. Life cycle can go from egg to egg in 1.5 to 2 months, depending upon temperature and host availability.

iv. Other insects that may be confused with bed bugs.

Other insects that can be confused with bed bugs may include: ticks, carpet beetle adults, larvae and their shed skins, German cockroach nymphs, stored product beetles and spider beetles.

B. Other Important Details

i. Temperature

Temperature regulates the speed of development of all the bed bug stages. The time required to go from egg to egg is typically 1.5 to 2.0 months based upon average indoor temperatures. However, development can be shortened to 1 month at 80° F or lengthened to 4 months at 64° F.

ii. Migration/Dispersal

Field studies, involving the release of marked bed bugs, have revealed extensive movement of bed bugs within and between apartments in multi-occupancy dwellings (apartments were either studio or 1 bedroom units). Adult bed bugs were found in a vacant unit 134 days after the unit was vacated. Small numbers of bed bugs were found in adjacent units (sides, top, bottom and across the hall).

iii. Hitchhiking

Bed bugs move from place to place by hitchhiking on or in people's belongings. They are successful because they are small, can go weeks between meals, and their eggs can be glued to the belongings. Additionally, a mated female bed bug can easily disengage from belongings and begin depositing eggs in a new location thus spreading the infestation. Routines, such as children going to a baby sitter every day, can insure the daily spread of bed bugs to and from the baby sitter with bed bugs being deposited at various locations throughout transit.

The purchase, rental, or use of second hand belongings of all kinds (especially furniture) can often lead to bringing home hitchhiking bed bugs. That makes flea markets, yard sales, dumpster diving, and even vehicles that pick up donated goods suspect and excellent sources of bed bugs.

Another type of hitchhiking is associated with service providers. This includes: hotel staff servicing hotel rooms; home health aides providing services to people in their homes; the ambulance service; doctor's offices; and, even the friendly piano tuner. Although typically impossible to coordinate, it is advised to limit these service providers contact with belongings and furniture at the location.

iv. Transportation

Because of the hitchhiking noted above, it is easy to see how the transportation system can become infested with bed bugs. The new use of Uber transportation services should also contribute to this spread.

v. Disease Transmission

Bed bugs carry many disease organisms on their bodies (as do ants, cockroaches, and flies) but the role they may play in the transmission of disease to humans is not clear. What is known is that the itching and scratching that some people experience when fed upon by bed bugs may result in secondary infections, especially if microbes or bed bug feces are introduced into the wound.

vi. Psychological Impact

Some people exposed to bed bugs respond with mental anguish and have difficulty sleeping. Continued exposure can lead to social stigma, limited socialization and feelings of abandonment. Even longer exposure to bed bugs can bring on paranoia, delusionary parasitosis or even suicide.

C. Control Tools and Protocols

It is envisioned that bed bug control per se will be carried out by a PMP firm. This 'Control Tools and Protocols' section was added so that the hotelier may gain an understanding of what may be done to control bed bugs at their facility.

Bed bugs do not like to be disturbed as they hide in their harborage. The level of disturbance is different between bed bugs located in a residence compared to a hotel. Bed bugs in a residence are most commonly found associated with the mattress and box spring as the bed is not typically disturbed except when the bedding is changed.

In hotels, the bedding is totally disturbed every day. In this situation, bed bugs are more commonly found associated with the seldom disturbed box spring, head-board and the bed skirt. These differences should be borne in mind in the training of hotel staff.

i. Insecticides

The following is a listing of insecticides designed to optimize bed bug control protocols. The list was based upon the latest field efficacy studies reported in the literature and by university speakers at professional bed bug gatherings. The insecticide label directs where the product may be applied (or not applied).

For Sleeping Surfaces: Bedlam® Insecticide, Bedlam® Plus Insecticide, Steri-Fab®
These products are registered for application of specific locations on sleeping surfaces. They kill bed bugs on contact and have a many day residual. Ideal for clearing mattresses or sofas of bed bugs.

Non-Sleeping Surfaces: Transport® GHP Insecticide
This product is a wettable powder formulation containing two insecticides from two different classes. The product is highly effective on bed bugs, resistant or otherwise and lasts many weeks. Ideal for treating the inside of box springs.

Void Treatment: CimeXa™ Insecticide Dust
This product, containing silica gel, is ideal for dusting wall voids, electrical outlets, and behind baseboards. It can also by dry painted onto the wheels and frames of bed frames. It lasts weeks to months.

*Active*Guard® Mattress Liner
This mattress liner, impregnated with the insecticide permethrin, kills bedbugs for two years. It is formulated as a fabric liner similar to a fitted bed sheet and is installed directly onto the mattress and/or the box spring which has previously been cleared of bed bugs using other products or measures. It remains on the bedding, never washed, and becomes the new surface onto which it is applied. For most bed bug populations, mortality of bed bugs is slow, often taking several days. Note that the label for this product contains no prohibitions for use on bedding, nor for the handling of the product.

Research from The Ohio State University has demonstrated that the product is not repellent to bed bugs and that 10-minute exposure to the fabric prevents feeding and thus egg laying, even in resistant bed bug populations. Additional supportive research from the University of Minnesota has revealed that a 10-minute exposure to the fabric resulted in a rapid movement of insecticide from the fabric into the bed bug.

Note: An already fed adult female bed bug placed upon the Liner, has no need to feed and because she is already full of blood, will lay viable eggs which will hatch. However, nymphs will starve to death as they will be unable to feed.

This product may be installed inverted on an un-infested box spring as a preventive measure. It may also be installed in the inverted position on a box spring as the last step in a bed bug control protocol for an infested room, where the mattress and box spring have been cleared of bed bugs using insecticides previously mentioned and/or heat. There are only four sizes (twin, full, queen, and king), which stretch to fit almost every mattress or box spring. Only one person is needed to install the liner, which takes only a few minutes at most.

All of the laboratory and field test data generated to support the effectiveness of the product for bed bug control are freely available on the manufacturer's web site, www.allergytechnologies.com.

ii. Heat

Hand held steamers can be used to kill bed bugs, especially on mattresses. This method is effective but very slow. Home and hotel dryers, run at their highest heat setting for 30 minutes also will kill all bed bug stages. Heat boxes, which vary in size from a suitcase size to one large enough to heat a room full of furniture can also be used for localized heat treatments. Another version of this approach is that some pest management professionals (PMPs) provide either trucks or trailer chambers that can be heated. These systems are most useful for heating electronics or furniture items that cannot be placed in a dryer.

Exposing bed bugs to dry heat at 113° F for one hour is lethal to all stages of bed bugs. Whole structure heat treatment is typically carried out by raising the temperature of the structure to 140° F for 3 hours. Whole structure treatment is challenging in that the correct placement of thermometers is critical to prevent pockets of bed bugs from surviving because of thermal protection. It also can take many hours for the structure to reach the desired lethal temperature. For these reasons, and because there is no residual control with a heat treatment, many structural heat treatments are complimented by the application of insecticide(s).

iii. Physical Methods

Vacuuming is a popular, though slow, method of reducing the size of a bed bug infestation. This process is most useful in debulking the mattress and/or box spring. Many vacuums are sold by distributors to PMPs for this use. Recently, one promising vacuum model, the Dyson DC34, was reported to have removed 700 bed bugs in less than 15 minutes (eggs, larvae and adults). More research is needed on this vacuum model and other similar models to determine if bed bug removal can be optimized as reported.

iv. Combination Approaches

Out of personal preference, some PMPs combine tools used in their bed bug control protocols. They may debulk mattresses with steam, vacuuming or insecticides. They may use heat to control bed bugs in a structure with a complimentary application of an insecticide. The PMP typically develops a bed bug protocol that is both effective for his firm and customers.

v. Resistance

As a result of battling bed bugs with insecticides in the 1940's and 1950's, bed bugs have developed resistance to DDT and similar insecticides. Resistance to DDT and other organochlorine insecticides resulted in near

automatic resistance to the pyrethroid insecticides used today because of similarities in the chemistry between the two classes of insecticides. When bed bugs re-appeared around the year 2000, most of the insecticides used by the PMP industry were not very effective, especially after they had dried.

The response by the PMP industry to the resistance issue was to focus on new classes of insecticides which would be unfamiliar to the bed bugs. Further, to reformulate and use current insecticides to facilitate the ease at which bed bugs can pick them up, thereby overwhelming the insect's resistance system. Both strategies have been somewhat successful. Older insecticides, now formulated as dusts, have been effective in controlling bed bugs as have new classes of insecticides. A newer approach, combining a new class of chemistry (neonicotinoids) with synthetic pyrethroids has resulted in several products demonstrating success in the control of bed bugs.

vi. Encasements

An encasement is basically a sleeve of material sized to completely cover all surfaces of a mattress or box spring. The sleeve is typically zippered on one side. The concept is to completely trap all bed bugs associated with the mattress or box spring where all of the bed bugs eventually starve to death (over months). The encasement becomes the new surface for the mattress or box spring, and because of the light color of the encasement material, new bed bugs, which can infest the surface of the encasement, are much easier to detect. Encasements also allow infested mattresses or box springs to be salvaged and used to forgo the cost of discarding the bedding.

More than 20 brands of encasements have appeared in the marketplace. They are made from polyester fabrics; terry cloth; laminated stretch knits; vinyl; polyester and nylon fabric; and, various patented fabric blends and membranes. Ideally, an encasement should prevent bed bugs from biting through the surface materials; should have a zipper lock mechanism that keeps the zipper closed; have test data that documents that the bed bugs cannot escape; and, be tear proof. In most situations, the mattress or box spring must be precisely measured so that the proper size encasement can be installed. Typically, two people are required for installation that is somewhat lengthy. A few encasements are constructed out of material that stretches to reduce the large number of SKU's typically associated with each brand of encasement. Very few web sites depict any test data for the encasement offered even if it has been reported as generated.

It is well known within the PMP industry that encasements have a great propensity for ripping, especially when installed on the box spring.

Research has indicated that ripped (or unzipped) liners allow bed bugs to escape thus defeating the purpose of using them. One manufacturer provided guidance on this issue. They advised that installers remove sharp objects (i.e. staples or sharp plastic corners) from the box spring and to use double sided felt to cover rough or sharp areas of bed frames. In terms of tears, they indicated that tears 3 inches long or less be repaired using white duct tape. There is no evidence to support that repair of encasements is a solution; most common, tears or rips require purchase of a new encasement.

D. Monitoring Protocols

The earliest detection of bed bugs is the best way to save time and money in their control. For hotels, areas monitored should include: rooms, luggage storage areas, housekeeping, staff lockers and break areas, laundries, kitchens, business offices, and the lobby including the areas behind the reception desk. The challenge in monitoring is the detection of low-level bed bug populations.

i. Active vs. Passive Monitors

Bed bug monitoring protocols typically use either active or passive monitors. Active monitors use one or more attractants, such as carbon dioxide, pheromone blends, or heat. Passive monitors do not have an attractant and depend upon strategic placement to capture bed bugs. Active monitors, such as the NightWatch™ Bed Bug Monitor and Verifi™ Bed Bug Detector, use all three attractants and rely on a pitfall trap to capture bed bugs. These devices are expensive and must be strategically placed to optimize bed bug catch. The commercialization of active monitors has been problematic and it is unlikely that a hotelier will be able to effectively use this technology.

Passive monitors rely on pitfall traps (ClimbUp®, ClimbUp HD® (hotel discreet) Black Out™ Bed Bug Detector, and SenSci Volcano™ (with or without pheromone lure) to catch bed bugs but because they are inexpensive, many can be used to optimize detection. Furthermore, some of these devices can be placed under bed legs or near bed legs to further increase the likelihood of trapping a bed bug. Other devices may be placed near the mattress and rely on glue to capture bed bugs. Passive traps that rely on a glue to capture bed bugs have not performed well in most situations in that bed bugs can extricate themselves.

Recently, research has revealed that significantly more bed bugs were caught in black or red traps. The bed bugs also exhibited strong orientation toward vertical objects, where color was not a factor. They could not orient on vertical surfaces under conditions of darkness but

could under low light situations. Rough surfaces were preferred over smooth or very rough surfaces.

ii. Canine vs. Human Inspections

While monitoring devices can be helpful in indicating general areas of a structure that contain bed bugs, an actual inspection is performed to determine the magnitude of the infestation. While most inspections are made by humans, these are not highly reliable but are simple and inexpensive.

Canine inspections (canine and handler) can be highly accurate in the location of live bed bugs and viable eggs quickly though expensive to implement. Many PMPs use human inspections on a day-to-day basis and employ canine inspections under certain situations, especially when the bed bug population is very low. Examples of low level instances include a movie theater where one is trying to determine which few seats harbor bed bugs, or in an office situation with cubicles where human inspection of cubicle walls is not practical. Canines are also used to confirm control or in monitoring/preventive situations. Some PMP firms have their own canines while other firms are dedicated to just providing canine inspections for PMP firms contractually. Canines should be certified and tested periodically.

III. The Direct Cost of Bed Bugs

A. Refunds

The obvious first direct cost of a bed bug infestation is a refund for the hotel stay. This might be for one night or more depending upon when the infestation was identified. The guest response can also be variable. Some guests who discover a problem may simply ask for another room. Others may ask for another room on another floor. Some guests may simply want to check out and may even present the hotel with a bill for food and the laundering of their belongings. Hotels that respond and accommodate guests who identify a bed bug problem may limit their financial exposure to the direct cost of the experience.

B. Cost of the control protocol

This can get expensive. Some hotels rely on a heat-centered control program while others an insecticide-centered approach. Heat treatments require significantly more time compared to insecticide treatments. Regardless of the control protocol, an inspection needs to performed to determine the extent of the problem. Typically, the infested room is treated per the protocol while the

adjacent rooms (above, below and both sides at a minimum) must be inspected at a minimum, to determine if they also require treatment.

C. Rooms out of service including adjacent rooms

How many rooms remain out of service depends upon the results of the inspection. Rooms that are deemed at bed bug risk must be treated and then re-inspected to determine when the rooms can be rented again. This can require days which compounds the overall cost of the remediation process.

D. Ancillary costs; discarding furniture; compensatory payment (e.g., food, gift cards) to guests; dry cleaning

As previously mentioned, guests can ask for other forms of compensation beyond the cost of the room. Guests may wish to dry clean their belongings, want meals provided as well as replacement of discarded belongings. Is my car infested? How can I take my infested suitcase home? This is not a good scenario for a hotel to experience and their staff must know how to handle and minimize this situation.

E. Repeat bed bug issues vs the hotel budget

Hotels budget for pest control. The problem is that bed bugs are not an ordinary pest. They are expensive to control and unless the hotel has a tight grip on policies/procedures and a highly effective PMP firm to deal with bed bugs, repeat infestations can be financially devastating. How can a hotel that charges $29.95 per night for a room effectively budget for bed bugs? This is an area that hoteliers should consider in terms of their approach to bed bug control from a budget standpoint.

IV. The Indirect Cost of Bed Bugs

A. Convention planners look for distinguishing features/technology to differentiate over other hotels

In some markets (e.g., with several nearby competing casino hotels), a hotel may choose to highlight their bed bug prevention program. This might cause convention planners to choose a hotel with a prevention program compared to a hotel that does not consider this a distinguishing offering to prospective guests.

B. Impact on Brand reputation - Citing on Bed Bug Registry/Trip Advisor

The negative ramifications from a hotel being cited on one of the social media web sites can be enormous. Potential customers, looking at hotel reviews, may not select hotels with bed bug incidents. Even worse, if more and more hotels from the same brand are cited, the entire brand may suffer. The only effective way to prevent being cited is for a hotel to have firm processes and procedures for their employees to follow so that bed bug complaints are handled properly and expeditiously.

C. Customer reports bed bug infestation now in their home

This complaint is very difficult to handle as it surfaces after the client's stay. How does a hotel refute this allegation? What if the alleged bed bugs now reside in their car and the guest attributes this to their recent hotel stay? This can quickly become an extraordinarily expensive issue. Some PMP firms have the training to fumigate bed bug infested vehicles should that be required.

D. Loss in Stakeholder Equity

How does a hotel manage the loss of brand equity? General managers may wish to send out mailings to hotels within their brand to highlight their concern for the impact of bed bugs on brand equity.

E. Loss in revenues

This is a direct result in not having firm processes and procedures in place to handle bed bug issues. The impact on revenue will continue to worsen unless the causes are identified, incidents are controlled when incurred, and steps are taken to reduce conditions conducive to bed bugs.

According to a recent survey of leisure and business travelers, the most common response of a traveler who found a bed bug in their room was to either switch rooms with compensation, or to switch hotels entirely. The status of bed bugs at a given hotel was the most important consideration when selecting a hotel room on the internet. On average, a report of a bed bug lowers the value of a room by $38 per night for business travelers and $23 per night for leisure travelers. Even finding signs of bed bugs in the room resulted in a significant rate of switching hotels (60%). Even worse, some people think that hotels have a 'duty to warn' with two thirds of people surveyed wanting to know their bed bug history for the present year!

V. The Legal Implications of Bed Bugs (Outline)

A. Creating a written hotel bed bug complaint action plan

i. What is the legal risk of not having an SOP Manual for bed bugs? Is it worse to have it and not use it or be completely without?

B. How having a preventive and pro-active bed bug plan in place can protect you legally

C. A look at recent lawsuits surrounding bed bugs at hotels

i. Common features
ii. Are there any overt avoidance behavior(s) that could be adopted?

D. Associated costs of bed bug litigation

E. Negative effect(s) of having hotel reputation tarnished from reports posted on bedbugregistry.com or tripadvisor.com

F. How does bed bug insurance work; terms and conditions

G. Disease carrying versus nuisance pest…Does the possibility of disease transmission (e.g., Chagas disease) change the landscape of litigation?

H. The checked-out guest who claims their 'bites' have been deemed by their physician/dermatologist as bed bug-related.

I. How to handle the client that is 'lawyering up'?

VI. The Hotelier's Response to Bed Bugs: Conventional (the old way)

A. Hotels traditionally have waited to act until there is a bed bug complaint or infestation.

This reactionary approach always leads to higher costs in the control of bed bugs plus it is harder to determine impact on the guest base. The hotel is faced with the problem at hand and endures the high cost of remediation. Hotel and brand reputation may be effected.

B. The movement of bed bugs to adjacent units.

Delaying remediation of a bed bug problem may lead to the potential migration to adjacent rooms creating a larger, more difficult problem to resolve. It increases the likelihood that additional guests will discover bed bugs, translating to further loss of revenue due to increased treatment expense and more rooms unavailable for rental.

C. Housekeeping as a means of moving bed bugs through service carts, vacuums and laundry services.

Untrained housekeeping staff are unable to assist management in the discovery of bed bugs thus providing no assistance in pro-actively dealing with the problem. The staff may even be contributing to the problem in importing bed bugs to the hotel from home, public transportation, or by simply moving bed bugs between rooms in the hotel during their daily service.

D. Comparison of control protocols.

Without outside assistance, hotel management has no way to compare control protocols proposed by PMP firms to control bed bugs. Inquiries from the hotelier to their brand management may help provide guidance on preferred and effective control protocols.

E. Bed bug resistance to insecticides.

Hotel management has probably heard about bed bug resistance but has no firm understanding as to the impact it has on control protocols. Integrated Pest Management (IPM) approaches, which involves the use of many control tools, such as steam, heat, vacuum, and several specific insecticides are the best multipronged strategies for the control of this pest

F. The drawbacks of a 'visual only' inspection vs canine.

Hotel management is likely unaware of the differences between inspection protocols except for the difference in cost. Visual inspection is often not very sensitive while canine inspections can be very accurate. Perhaps a quarterly canine inspection of a hotel, or at minimum, non-guest room areas of the hotel would be useful in preventing an unseen infestation from developing.

G. Often times the infestation is uncovered only after a guest is bitten or notices signs of bed bugs and reports to management.

It is always problematic when the guest brings bed bug problems to the front desk. They are incensed and the cost to the hotel to resolve the issue escalates rapidly.

H. PMP may issue a guarantee for their control efforts but for how long? Is a new bed bug problem re-emergence or re-introduction?

Hoteliers should maintain a record of bed bug issues within their hotel. The record should reflect room or location in hotel, the date, what was found and type of control conducted. There is a need to distinguish between incidents where bed bugs or their evidence was found vs those incidents that were not substantiated. The hotelier can investigate patterns in bed bug issues such as: which rooms were involved; duration of involvement; frequency of involvement; and, the degree of impact on adjacent rooms. Some hotels have developed a map of all rooms commenting on each occurrence thereby assisting in detecting patterns of bed bug activity.

It is important to distinguish if activity is the result of re-emergence, where bed bugs have escaped the treatment and are now simply continuing the infestation or rather a new introduction. A reintroduction cannot be prevented but a re-emergence would indicate that the control protocol failed!

VII. The Hotelier's Response to Bed Bugs: Preventive (the new way)

A. Preventive Approach

A preventive approach, including implementing steps to prevent guests from discovering bed bugs in their room, is a better way to manage bed bug issues. It includes a staff trained to detect bed bugs, the use of preventive

pest management tools to reduce the chances of a bed bug infestation, and a complaint action plan to mitigate the result of a guest detecting bed bugs in their room.

A couple of bed bugs may arrive at a hotel room by emerging from a guest's luggage (an incident). However, a bed bug infestation found in a hotel room, with fecal spots, many life stages, eggs, and cast skins, occurs because the neither the hotel staff nor guests noticed them at the outset of the introduction. An incident is not preventable but an infestation is. Regardless whether it is an incident or infestation, how the hotel handles the complaint is critical to the management of the problem, and the financial and reputational impact to hotel and brand.

A bed bug complaint action plan is critical to the management of bed bug issues within the hotel and to the prevention of a complaint escalating into a legal action.

The following approach can help a hotelier to develop a bed bug action plan to deal with complaints and to empower employees to properly handle the situation when it arises.

B. A Hotel Bed Bug Complaint Action Plan

A negative experience by a guest, like uncovering bed bugs, can quickly go one of two ways: it can be a non-event if handled correctly or it can turn into a public relations nightmare resulting in your appearance on the local news, bedbugregistry.com and tripadvisor.com. Bed bugs are unquestionably one of the worst complaints any hotelier wants to experience!

Preparing your staff to handle such a situation is one of the most important proactive steps you can take. Establish a written action plan so your employees are prepared to handle a bed bug complaint and reduce your chances of it turning into a public relations nightmare. Make certain that once established, this action plan is followed precisely as deviations/omissions can result in significant legal consequences. However, nothing is worse that the absence of a cogent action plan addressing a bed bug issue. The following tips can help you create your own unique bed bug complaint action plan to ensure that you are empowering your employees to properly handle the situation when it arises.

i. Guests reporting a bed bug complaint will likely approach the front desk angry and concerned. Always empathize with the guest(s) and be prepared to answer their questions honestly and confidently. A prepared Q&A sheet on bed bugs will help employees be prepared.

Discuss these questions and answers with your PMP and practice

responses with your Housekeeping and Front Desk staff. It should contain questions such as:

Question: *Do bed bugs transmit disease?*
No, according to the Center for Disease control; bed bugs are not known to spread disease.

Question: *Could I take bed bugs home with me?*
Drying all of your clothing at home on the hottest temperature available for 20-30 minutes will kill bed bugs and their eggs. Vacuum the outside of your luggage well upon returning home and dispose of the debris. Do not return your luggage to a sleeping area of your home. Store it instead in the garage, attic or basement.

ii. Interview the guest about what signs of bed bugs they have found. Have a plan in place for the in-house pest management or other trained personnel to thoroughly inspect the hotel room for bed bugs. If evidence of an infestation is found, ensure that the inspector places a sample in a sealed container to confirm the identification of the pest found by a PMP.

iii. If the guest has unpacked, offer to securely bag all clothing and have them washed and dried to ensure that no bed bugs or eggs remain on the clothing. Have their luggage inspected and vacuumed to ensure that no bed bug remnants are left behind. Ensure they are aware of the precautions you are taking to protect them from taking bed bugs home.

iv. Have staff handle the packing and movement of all of their belongings at no charge (typically in the guest's presence).

v. Assure the guest(s) that they will be relocated to a room at the very opposite end of the hotel.

vi. Seriously consider compensating the room for their entire stay.

vii. Always apologize profusely for the inconvenience. Gently remind the guest that bed bugs do not discriminate and while you have a 'best management practices' pest control protocol in place (mandatory requirement) they may have been introduced by the guest immediately before them and missed by housekeeping. Assure them that you are taking every precaution you can to protect them and their belongings from bed bugs.

viii. If evidence of bed bugs is confirmed in the room, immediately take the room out of service and contact your licensed PMP to service the room and the surrounding rooms for bed bugs.

ix. Follow the advice of your PMP to determine how long each room (target and surrounding) should be taken out of service and when it is safe to return to room back to rental status.

While some of the above precautions may seem extreme and expensive for a hotel to adopt, just imagine how news about the hotel having bed bugs could impact the bottom line. Internet sites like bedbugregistry.com and tripadvisor.com make it extremely easy for guests to speak to the masses about a negative experience, truth notwithstanding. Having trained personnel ready to handle a potential bed bug incident/infestation will pay enormous dividends and support hotel profitability.

Provide contact names and numbers, demonstrate accountability and responsibility with humility.

C. Hotels should use a preventive approach to reduce control cost and to protect brand reputation.

A preventive approach to bed bug management is a good way to prevent the cost of bed bug management from reaching six figures and also damaging hotel brand reputation. This approach can save both large and small hotels a great deal of money in the long term. The Cost Benefit Analysis (Appendix 1) is based upon an actual, multi-year use of *Active*Guard Mattress Liners in a large metropolitan convention hotel (1600 rooms) compared to the hypothetical use of the Liners in a smaller hotel (200 rooms).

D. Steps to the Plan:

A preventive plan based upon un-infested rooms or in rooms cleared of bed bugs should include:

i. Cover each and every bed and/or box spring with an active mattress liner.
ii. Use passive monitors
iii. Periodic visual and/or canine detection. Early detection is key and the areas inspected should include: housekeeping (also vacuums and service carts), lockers, and luggage storage areas.
iv. Educate the staff on how to identify signs of bed bugs.

E. A trained housekeeping staff is the hotelier's 24/7 eyes and ears.

A reward ($5, for example) to staff for detection of a bed bug problem before it comes to the attention of a guest can be a great way to prevent bed bug problems by incentivizing inspection.

F. Hotel staff training module in English and Spanish (or the native language of the common employee and guest demographic), with pictures.

The staff should be reminded that bed bugs hitchhike on belongings, such as second hand or discarded furniture.

G. Openly advertise what steps the hotel has undertaken to prevent bed bug issues and what a guest should do if they suspect something.

Guests should be informed, and one possibility is to have placard or other written notification in the vicinity of the lobby's front desk area that hotels are always susceptible to bed bug issues, which cannot be prevented. However, this hotel has taken steps to prevent, to the best of their ability, guests from being surprised by bed bugs. The preventive steps include: clear lines of communication between all levels of the hotel staff should any signs of bed bugs be suspected or observed; training the staff to recognize bed bugs and signs of bed bugs as they service the rooms; and, interceptive active liners installed on all box springs to assist in the control of any undetected bed bugs. Include hotel room design features that have been implemented to reduce the probability that bed bugs can survive undetected in any given hotel room within this hotel. A PMP firm should be on call, night or day, for any bed bug confirmatory identification and control service needed. A note in each room detailing whom to call within the hotel should a guest have concerns or sees something that concerns them about bed bugs may also be considered.

VII. The Future of Bed Bug Management

A. Designing a bed bug free hotel room

The design choices being considered for room refurbishment may also be creating a welcome environment for bed bugs. So what does hotel room design have to do with infestations? Making tweaks to current hotel room configurations, considering changes in future design plans or implementing preventive bed bug measures can certainly assist in lowering the number of bed bug infestations in hotel rooms.

i. Headboard design. Upwards to 85% of bed bugs are found within a 5-foot radius of the bed, with headboards being notorious for egg deposition. Removing upholstery in its design would be a marked step forward in reducing harborage, given the folds and tufts (similar to a mattress and box spring) routinely found in this furniture. Also, straight design with little

to no textured woodwork reduces areas susceptible to egg deposits. In addition, attention should be drawn to the backside of the head board (that affixes to the wall) as this area is routinely a 'hot spot' for bed bug activity.

ii. Box spring dust ruffles. Dust ruffles that cascade onto the floor are an easy entrance ramp for bed bugs to crawl onto bedding. These ruffles are often highly pleated and cinched making favorite hiding and bed bug egg repositories. Highly suggested are the new decorative fabric covers available that fit snuggly onto the box spring (foundation).

iii. Box Spring Platforms. Typical railed box spring frames are replete with 'nooks and crannies' commonly strewn with bed bug eggs when an infestation occurs. In contrast, the use of metal box spring platforms is far less conducive toward bed bugs harborage in the event that a room is challenged.

iv. Active Liners. Unlike an encasement that simply protects the bed, an active liner protects not only the mattress and/or box spring but also the guest sleeping in the bed. As easy to install as a fitted sheet, an active liner such as *Active*Guard® Mattress Liners can prevent a bed bug infestation as they kill bed bugs that come into contact with the liners continuously for two years. Installation of this simple preventive measure can stop bed bugs introduced into the room from turning into a full-fledged infestation.

v. Pictures. Wall coverings (e.g., pictures) that are secured with nails or other implements that puncture the wall are commonly found harborage sites for bed bugs and their eggs. While it is probably not reasonable to suggest that pictures not adorn hotel room walls, it is recommended not placing them on the wall on which the bed and headboard rests.

vi. Window treatments. Draperies and most specifically valances are notorious sites for bed bug harborage. Design choices that use the least amount of tufting and pleating should be considered in room design to reduce the likelihood of these design elements becoming sites for egg deposition. Alternatively, wooden or other non-upholstered valances would further reduce these areas as harborage sites.

vii. Seating furniture. While aesthetics and comfort are often key elements in selection, upholstered couches and chairs do pose risks for bed bug harborage. If upholstered seating is chosen, those with fixed seating and backrests (as compared to loose pillow designs) are recommended.

viii. Luggage rack replacement/availability. Guests dropping their suitcases on beds represent the most likely introduction of bed bugs onto

bedding or other upholstered furniture. In lieu of a luggage rack often stowed in a closet, a hard surface furniture element designed for placement of luggage is preferred as it does not provide easily hidden bed bug harborage sites

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Appendix 1

A Cost Benefit Analysis of the Preventive Use of *Active*Guard Mattress Liners in a large hotel and a smaller hotel (*as detailed in ActiveGuard® Mattress Liners for Bed Bug Control in a Large Metropolitan Hotel – PCT Magazine, January 19, 2016*).

Assumptions	**Large Hotel**	**Smaller Hotel**
Room revenue per night	$200	$150
Number of room in hotel	1,600	200
Average number of beds per room	2	2
Number of infestations per year	100	12
Number of rooms removed from Service per infestation	5	5
Number of days of lost revenue Per infestation	7	7
Cost for PMP services per infestation	$1,000	$500
Cost of *Active*Guard per room (2 Liners at an annual cost pro-rated over the two-year life of the product	$80	$80
Number of *Active*Guard installed	**3,000**	**400**
Lost revenue (80% occupancy) per year due to infestations	$560,000	$50,400
PMP costs	$100,000	$6,000
Total cost per year	$660,000	$56,400
Cost of *Active*Guard per year Amortized over two years	$128,000	$16,000
Savings per year	**$532,000**	**$40,400**
Projected savings per year if *Active*Guard prevented 80% Infestations	**$425,600**	**$32,320**

Appendix 2:

A. Hotel Case Studies

*Active*Guard® Mattress Liners for Bed Bug Control in a Large Metropolitan Hotel – January 19, 2016

"Do Not Disturb" – editorial by Jeff Fenner, PCT Magazine - Bed Bug Supplement, June 15, 2016

B. Brand Reputation

Disturbed - Jerrod Penn, Wuyang Hu and Michael F. Potter, PCT Magazine, November 2015

C. Hotelier Advisory Group

In Development (as of August 2016)