ActiveGuard®

Bed Bugs & Prevention…

Is It Possible?

According to Merriam Webster, Prevention — noun — pre·ven·tion \pri-'ven(t)-shən\ is defined as the 'act or practice of stopping something bad from happening.' A key element to EPA's 'The Federal Bed Bug Workgroup,' which has completed its 'Collaborative Strategy on Bed Bugs,' highlights four priority areas for bed bug control…Prevention is the 1st identified goal.

However, given the ubiquitous nature of this insidious pest that thrives in transient environments, can a cost-effective and sustainable prevention program be implemented, consistent with the best practices of integrated pest management? Does the variety of transient environments pose unique problems or are there common tools or strategies that can be implemented across all of them?

Let's read how four renowned urban entomologists attack bed bug prevention in colleges and universities, low-income housing, hotels and assisted-living environments.

POWER OF PREVENTION

Assisted-Living & Bed Bugs

Jim Ballard, PhD
Ballard Pest Management Consulting, LLC

For the purpose of this discussion, assisted-living facilities need to be inclusive of rehabilitation facilities and nursing homes as many facilities are comprised of two or more of these living arrangements. However, the common denominator is they are all fraught with the same bed bug issues.

These facilities encompass many one- and/or two-room living quarters occupied by one or two senior adults who tend to live a sedentary life. While the length of the stay is generally measured in days to weeks for rehabilitation facilities, the length of stay for assisted living and nursing homes can be many years. The room occupants in assisted living environments are often not related, thus an influx of new people continue into these living quarters, which expands the number of opportunities for bed bugs to be introduced.

Assisted-living facilities typically offer several group meeting areas for meals, crafts, and other types of entertainment, which introduce further opportunities for bed bugs to be shared by the entire resident population. There are also several small rooms set aside for services such as hair care, manicures, pedicures, and dental work that are high resident flow-through areas where bed bugs may be found. Space often being at a premium, these facilities tend to be cramped to accommodate all of these activities, with personal belongings and medical equipment compounding the issue. Some of the medical equipment may actually be rented (with bed bugs as an uninvited add-on) or shared by other residents, increasing the likelihood of bed bugs spreading throughout the facility.

There are many visitors and external service providers that visit these facilities, which provide once again a tremendous opportunity for bed bug introduction. In some facilities, the family of the resident may have opted to do the personal laundry for their loved one, and the family may inadvertently transport bugs back to their loved one with the clean laundry. Coupled with the visitation frequency between residents and the potential for facility staff to introduce bed bugs or relocate them among the residents as they perform services, these facilities represent the 'perfect storm' as an opportune entrance of bed bugs to the facility.

Due to frequent visitors and the sedentary nature of its residents, assisted-living facilities are at risk for bed bugs.

Bed Bug Prevention

Prevention is very important in assisted-living facilities because the residents are often not very mobile or cannot readily be moved; typically, an alternate place to move is unavailable. In addition, many of the residents have poor vision for close items and may not even be able to see bed bugs or understand what they are looking at. On many occasions, these residents believe they are experiencing a problem where one does not exist. As many as 30% of the human population show no response to bed bug bites and the elderly constitute a major portion of this unaffected population.

Therefore, it is critical for the facility staff, especially those that work in the laundry, to be extra vigilant in detecting bed bugs. Residents should also know who the designated staff contact person is should they detect a pest problem. The more independent residents are at less risk in allowing a problem to manifest and should have sufficient contact with the staff to ensure that they do not have a widespread bed bug infestation.

A stepwise approach is required:

- The first step in bed bug prevention is to educate all levels of facility staff in the 'basics of bed bugs' so that they can detect bed bugs as soon as possible. While a delicate situation, the staff should pay attention to incoming residents to try to detect incoming bed bugs as early as possible.
- Next, there should be a central person on staff, preferably for each shift, where all bed bug (and other pest) concerns are reported. Issues are to be addressed in a timely and professional manner, in part, to allay the fears of the residents. Residents who are confident that their problems are being resolved quickly and with dignity are prone to report future incidents.
- A pest management professional (PMP) firm must be engaged and be on-

call to deal with bed bug situations. Their protocols must account for control measures that can be used among the resident population within the facility, assuming that relocation is unlikely and compliance may be less then optimal. Strong consideration should be given to pro-active scheduled inspections of medical equipment in frequent use by residents, such as walkers and wheelchairs, and the furniture located in public spaces within the facility. Bed bugs detected within the facility should be left undisturbed for the PMP to control. Bagging of personal items or attempts to treat the problem by residents or staff often inadvertently leads to intensifying and spreading the problem.

• Areas of the facility which are not open to the residents, such as staff lockers, office areas, loading docks, storage areas, nursing stations and the laundry facility, should be monitored using one of the several pitfall-style traps available. Once installed, these monitoring traps need to be inspected on a regularly scheduled basis and the results of each station recorded to demonstrate a viable detection program is in place.

• The use of *Active*Guard® Mattress Liners should be encouraged in situations wherever they can be installed. The bedding found in assisted-living facilities is often suitable for Liner installation (inverted on the box spring). Installation in rehabilitation and nursing home facilities may require more forethought due to the higher use of hospital-like shaped bedding. The PMP under contract should be able to install and service the Liners when replacement is required; every two years.

Success Is Possible

While assisted-living facilities pose a special set of circumstances in bed bug prevention given the nature of a relatively immobile population that does not always recognize the existence or severity of the problem, cost-effective prevention can be achieved through education, awareness and implementation of a few proven monitoring and preventive devices. ▫

ActiveGuard®

Hotels & Bed Bugs

Gail M. Getty, MSc., BCE, QAL
Domus Institute (Founder and Principal)
University of California, Berkeley (Retired)

The hospitality industry is particularly vulnerable to bed bug infestations.

The hospitality industry was on the forefront of media reporting bed bug outbreaks in early 2004 and has continued ever since. This industry was particularly vulnerable due to two important factors, namely, bed bug 'biology and behavior,' and hotel 'biology and behavior.' Bed bug biology requires a blood meal (preferably humans) and their behavior is to often hitchhike to new sources for their sustenance. The hotel community 'biology' survives on frequent guests who, unfortunately, may be carrying bed bugs. The guest's behavior is to stay a relatively short period of time and move on possibly with bed bugs as their travel companion.

To exacerbate this further, many hotels are open to the public 24 hours a day with casual guests coming and going in common areas for eating, drinking, socializing, attending conferences or going to spa facilities. To further complicate the issue, the bowels of hotels have an entire unseen-by-the-public life of their own, filled with massive laundry facilities, staff offices, locker rooms, and furniture storage facilities attended by masses of workers moving about.

Hotel guests typically have lofty requirements, expecting conditions at the property should be perfect at all times. This 'high bar of quality' is equally shared and strived for by most hotels. Examples of this heightened hotel standard is clearly exemplified when it comes to safety, which includes food, cleanliness, hazards, criminal activity, fire, air and

POWER OF PREVENTION

water quality and vermin. But is the hotelier prepared during litigation to answer the poignant question: "What have you done to prevent bed bugs in your facility?" Many hotels have learned that avoidance and/or inaction in addressing bed bug-related incidents can result in an exponential negative impact on their business.

The most publicized event impacting hotel's revenue, brand reputation and stakeholder equity can be witnessed whenever a guest reports a bed bug incident on an internet social media site. When a guest reports bed bugs to hotel management they expect, at the very least, to be able to change rooms and, at times, be compensated for a portion if not all of their stay. In many instances, guests will still report their experience via social media without confirmation that bed bugs were the actual pest involved. Misidentification of the insect is a critical bottom-line problem for hoteliers, especially due to a lack of accountability regarding the accuracy of the findings reported on-line. There are several reports and studies indicating that most of the public will read hotel reviews before booking a room and a report of a single bed bug experience will deter many travelers (Penn et al. 2015). Hoteliers have taken this problem seriously and have addressed the problem head-on.

Since the early years of the recent bed bug outbreak, the hospitality industry has made strides in managing bed bugs in their facilities. Since this outbreak took all industries related to this insect by surprise, it is no wonder that hotels learned many lessons the hard way. However, there are clear signs of the hospitality industry embracing new research and tools such as bed Liners, monitors, and heat to name a few, that are proving efficacious in mitigating problems (Getty 2008, Getty et al. 2008)). Many have come to see that the key is a successful prevention program!

Many in the hospitality industry have seen these successful programs evolve over time. Most are based on a foundation in prevention, education, and monitoring. In concert with the hotel's contracted pest professional, dedication and diligence to an established program and the ability to recognize important new trends and tools for better bed bug control are proving to be successful. Prevention has been on the forefront of overall bed bug control strategies and is starting to be implemented throughout this industry. Recent surveys have shown most guests want to stay in hotels with bed bug protection, even if they prefer not knowing the specifics of the program (Penn et al. 2015).

Preventing bed bug access to guests is critical for the hospitality industry.

One key solution in prevention is providing a means to prevent bed bug movement to hosts. Dr. Susan Jones, professor of entomology at Ohio State University, has found one promising tool that she reported in an article in the Journal of Medical Entomology – active mattresses and/or box spring liners sold under the name *Active*Guard® Mattress Liners by Allergy Technologies. These Liners are impregnated with an insecticide called permethrin, which can be found in many clothes worn by hikers and others to deter pests while outdoors as well as the active ingredient found in products used for head lice, medical creams and some pet products. Dr. Jones found the *Active*Guard® treated fabric effective, even with bed bug populations resistant to synthetic pyrethroids. She also found the *Active*Guard® Mattress Liners not repellent to bed bugs (Jones et al., 2013). Bed bugs exposed 10 minutes to the fabric were less likely to even try to feed compared to bed bugs exposed to untreated Liner fabric. Dr. Jones also reported bed bug probing behavior to feed was reduced after one (1) minute and a reduction in feeding after ten (10) minutes of contact with the treated fabric. This reduction in feeding resulted in a marked decrease in female bed bugs depositing eggs and was independent of resistant status (Jones et al, 2015).

*Active*Guard® for the hotelier is not only a preventive measure, but an on-going commitment to managing bed bugs over time. For example, finding dead bed bugs under or near the treated Liners can be one means of identifying an emerging bed bug problem. In addition, when a guest requests a room change believing they have been exposed to bed bugs, having the protection of an *Active*Guard® Mattress Liner in any room a guest is moved to can be one component in a comprehensive preventive program.

Other tools in a preventive program may include on-going preventive visual or canine inspections, and education of staff. Monitors have been proven a good tool in a bed bug program although care must be taken in placing them in areas that are not visible to the hotel guest. Many hoteliers have reported major improvements in early bed bug detection by educating hotel staff.

In conclusion, hoteliers today are much more sophisticated in the tools and programs available in fighting bed bug battles. Most continue to strive for and reach the 'high bar of quality' they and their guests expect. The foundation of their programs will probably continue to be rooted in prevention and monitoring for some time. □

References

Getty G.M. 2008. Keeping up with Bed Bugs. *In* The Voice of Pest Control Operators of California. Winter 2008 issue. Page 11.

Getty, G.M., R.L. Taylor and V.R. Lewis. 2008. Hot House: Control of bed bugs using heat technology. *In* Pest Control Technology Magazine. February 2008 issue. Pages 96-100.

Jones, S.C., J.L. Bryant and S.A. Harrison. 2013. Behavioral responses of the bed bug to permethrin-impregnated *Active*Guard® Fabric. Insects. 4:230-40.

Jones, S.C., J.L. Bryant and S.F. Sivakoff. 2015. Sublethal Effects of *Active*Guard® Exposure on Feeding Behaviour and Fecundity of the Bed Bug (Hemiptera: Cimicidae). Journal of Medical Entomology, 1-6 (2015): DOI:10.1093/jme/tjv008.

Penn, J., W. Hu, M.F. Potter. 2015. Disturbed! Pest Control Technology. 11/25/2015 issue.

ActiveGuard

Colleges & Bed Bugs

Philip G. Koehler, PhD
Professor, Entomology and Nematology Department, University of Florida

Colleges and universities experience special problems when it comes to bed bugs and other pests on campus. A campus is a special place that is essentially an entire community. There are places where food is served and eaten, classrooms for instruction, offices where students meet with professors and libraries where students study and read books.

Of course, there are dormitories and apartments where students sleep. All these are areas where bed bugs can become a problem. Additionally, there are people with many different expectations when it comes to their tolerance of pests and also the pesticides that are used for control.

From personal experience, I can tell you a little about bed bugs on campus. Bed bugs may be found on chairs in the cafeteria, library, offices and classrooms. But most problems are experienced in the places where students sleep; in their dormitory or apartment beds.

At our university, the dormitories do not have many bed bugs. The mattresses supplied in the dorm rooms are covered with plastic, and they seem to be poor places for bed bug survival. There are no box springs for bed bug harborage. In one case, where bed bugs were found in the dorm room, the girl had been sleeping at her boyfriend's place off-campus and had brought the bed bugs back to her room. So the habits of students definitely place them at a higher risk of bed bug infestation than most people.

Off-campus housing can have an impact on bed bugs being spread onto campus. In fact, at our university, more than half of the students live off campus. Apartment complexes close to campus fight bed bug infestations daily. Most of the problems on campus are due to the spread of bed bugs from these off-campus housing units.

We have found that foreign student housing in apartments is the worst situation for bed bugs. These students come to this country, usually via a plane, with few belongings. When they check into their unfurnished housing unit on-campus or off-campus, they have to buy furniture, food, and other essentials. They typically do not want to spend a lot of money so they buy used furniture or have it given to them by students who have graduated and are leaving school. When it comes to buying bedding, they do not want to purchase a $2,000 mattress and box spring, so they buy a used one for less than $100. Several years ago, we bought four used mattresses from a mattress supply store used by many of our students to research bed bugs. One of the mattresses was already infested.

The use of used mattresses, box springs, sofas, and overstuffed chairs either purchased or shared by students has been one of the most important ways bed bugs get introduced into campus. The remaining problem then is to protect these students from being subjected to these infestations in a way that is acceptable to students, as well as their parents.

There are several factors about bed bug

POWER OF PREVENTION

prevention and control that has set off alarms. Most students from the U.S. have been protected all their lives from things like bed bugs. Their parents go crazy when they find out their child has experienced a bed bug problem. They want the bed bugs gone, but they do not want the beds sprayed with insecticide.

However, foreign students often have a different reaction to bed bugs. We had one student from India who was taking his final exam and had a fabulous infestation in cardboard that he had placed under his mattress because he did not own a box spring. The cardboard was bulging with bed bugs. The student was studying for finals and did not want to be bothered. He did not react to the bed bugs and just wanted to be left alone. He did not care that he was spreading bed bugs throughout campus.

Bed bug prevention and control is especially challenging and continuous on college and university housing. The interaction of students from different cultures results in a mix of expectations when it comes to bed bugs and their control. The primary objective is to prevent bed bug movement to hosts.

In our laboratory, we have found that we get complete knockdown and kill of bed bugs with *Active*Guard® Mattress Liners within 75 minutes of contact. We know from Susan Jones's work at The Ohio State University (S. Jones et al., 2015) that almost all bed bugs exposed to the Liners do not feed or lay eggs after just 10 minutes of exposure. So there is great potential in using these mattress Liners to protect college students from bed bug infestations.

Many people have an incorrect understanding of the use and installation of these Liners. *Active*Guard Mattress Liners are registered for sale by the EPA and have no cautionary signal words or precautionary statements on its label. The active mattress liner is fashioned as a fitted sheet that once installed overlaps the sides of the mattress or box spring. Once the Liner is in place, a fitted sheet, blanket and/or comforter is typically used that alleviates any concern about direct contact with the treated Liner. However, when installed in the preferred inverted position on the mattress, the main panel of the Liner faces the floor, further removing any likelihood that the Liner would come into direct contact with the sleeping student. In this configuration, a bed bug moving from the floor to a sleeping person would have to crawl across and contact the treated surface. If a box spring is used, there is no issue as the installed Liner is one sleeping surface away from the student.

The active mattress liners are installed easily by one person. In contrast, mattress encasements usually require more than one person to install and do not protect a sleeping person from a bed bug crawling from a harborage to the bed for a blood meal. In some student housing, we have found bed bugs harboring behind the rubber kick plates on the lower wall. Most times these infestations cannot be controlled without removing all the rubber molding. *Active*Guard® in these cases give an extra certainty of protecting our young people.

Bed bug prevention on college and university campuses is challenging. The use of all tools that are appropriate for the unique situations encountered on these campuses can assure students and their parents that the school has done everything possible to prevent bed bug infestations. □

Low-Income Housing & Bed Bugs

Susan C. Jones, PhD
Professor, Dept. of Entomology, The Ohio State University

United States census data reveal that ~43.1 million people were in poverty in 2015 (Proctor et al. 2016). This represents an official poverty rate of 13.5%, down 1.2 percentage points from 14.8% reported in 2014. Children (14.5 million) accounted for 33.6% of the poor. In all age groups except for children, more females than males lived in poverty. Furthermore, the poor encompassed all races and ethnicities and cultural backgrounds. Many had limited education and hence limited job prospects. Thus, people in poverty share the commonality of having limited economic resources, but otherwise they have diverse characteristics.

Public housing was established to provide safe and decent rental housing for eligible low-income families, the elderly, and those with disabilities, and it is administered by the U.S. Department of Housing and Urban Development (HUD). U.S. citizenship or eligible immigration status is a requirement for federal housing benefits.

Approximately 1.2 million households currently live in public housing (http://portal.hud.gov). In general, residents may stay in public housing as long as they comply with lease requirements. Public housing comes in all sizes and types,

with ~49.5% of low-income households living in single-family homes or townhomes, 41.0% in apartments, and 9.5% in mobile homes. It is a rental requirement that HUD housing is in "good repair," although there is no strict definition of such. Housing quality is important since aging, dilapidated structures offer many cracks and crevices that serve as bed bug harborage sites; furthermore, gaps allow bed bugs to readily move between units.

Bed bugs are important pests since they preferentially feed on humans and are closely associated with human habitations. These bugs are known only as indoor pests, and they do not survive in outdoor habitats. However, in extreme infestations, the bugs can spill over to the building exterior—they occasionally have been reported on the outside of buildings or on porches, particularly in items kept there. Bed bugs are not known to travel across outdoor expanses to reach adjacent buildings.

Since people in the U.S. spend most of their time indoors (~90%), with nearly two-thirds of that time in their own home (Wahowiak 2016), bed bugs take on even more importance due to our habits. Bed bug prevention is very important in all types of housing. However, given the diverse clientele in low-income housing, it can be difficult to educate all residents. Cultural and language barriers can interfere with prevention and management of bed bugs. For example, canine inspections can be an important inspection tool, yet Somalis do not allow dogs in residences since Islam forbids touching or being near dogs (http://www.culturecareconnection.org/matters/diversity/somali.html). Hence, in these residences, it may be necessary to rely on visual inspections and on-site monitoring devices.

As in many rental properties, fear of eviction can be an important issue in low-income housing that can preclude early interventions for bed bugs. The unnecessary stigma associated with bed bugs is also important and can be particularly prevalent among the elderly. Several years ago after leaving a severely infested apartment occupied by an elderly woman, a lab member discovered 13 bed bugs tucked away in the tread of his sports shoes. This resident denied having bed bugs and refused treatment, yet it was readily apparent that bed bugs were hitch-hiking with her and visitors to other areas in the high-rise apartment complex and beyond. Bed bug prevention in low-income housing involves education to overcome such stigmas and fears.

A local housing agency (HA) is responsible for the management and operation of its local public housing program (http://portal.hud.gov). An effective preventive program in low-income housing should entail measures implemented by the HA, including:

1 'Buy-in' to explain the signs and symptoms of bed bugs (with language familiar to the residents) along with encouragement for tenants to promptly report any signs of bed bugs so that early-stage bed bug issues can be targeted. Management should play an important role in education, awareness, and vigilance at a property.

2 Commitment to allowing ONLY qualified PMPs with considerable, successful bed bug experience

to service the facility. Concomitantly, property management should dissuade over-the-counter product use by residents and 'off-the-street' applicators. HAs should ensure that integrated pest management (IPM) strategies are followed when dealing with bed bugs and other insect pests.

3 Recognition that bed bugs are a facility problem and addressing it as such. Although these bugs may manifest in certain units, they pose a risk to the entire facility. Emphasis should be on protecting the residents and the facility rather than simply treating an infested unit. Protocol should be that bed bug IPM in an infested unit always includes inspection, and possible treatment, of the cloverleaf of surrounding apartments. An ongoing building-wide inspection schedule for bed bugs and other pests should be instituted by HAs.

4 Institution of on-going preventive measures (education, awareness, vigilance, monitoring, inspection, *Active*Guard Mattress Liners, etc.).

The above preventive measures should ensure the bed bug-free aspect of HUD housing as we strive to accomplish healthy homes for all. ▫

References

Proctor, B. D., J. L. Semega, and M. A. Kollar. 2016. *Income and Poverty in the United States: 2015.* U.S. Census Bureau, Current Population Reports, P60-256(RV), U.S. Government Printing Office, Washington, D.C.

Wahowiak, L. 2016. Healthy, safe housing linked to healthier, longer lives: Housing a social determinant of health. The Nation's Health 46(7): 1-19.

ActiveGuard®
Mattress Liners for Use Against Bed Bugs & Dust Mites
(866) 978-6288

Four Experts Agree: Prevention Is A Priority

Four independent perspectives on the implementation of bed bug prevention in various transient facilities have demonstrated certain common elements: education, awareness, sensitivity to language and cultural differences, monitoring, and periodic inspection. Consistent throughout these preventive strategies is the use of *Active*Guard Mattress Liners, a mattress and/or box spring cover labeled for two-year prevention and control of bed bugs. Why ActiveGuard?

Bed bug prevention requires the use of simple, user-friendly, maintenance-free products with extraordinarily long residual action. *Active*Guard has repeatedly demonstrated field data supporting the 2-year ability to prevent infestations in transient facilities before they establish, when used as part of an integrated pest management program. These mattress Liners are the ideal candidate as part of a strategic preventive IPM program for bed bugs.

www.allergytechnologies.com