PULLING BACK THE SHEETS ON THE BED BUG CONTROVERSY:

Research, Prevention and Management in Hospitals & Long-Term Care Facilities

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No one wants the bed bugs to bite, but when they do, what are the implications? Is it a health risk or a health concern? The prevalence of bed bug infestations has risen steadily over the past 10 years, and questions about the dangers they pose to humans continue to be debated. Recent scientific and media attention given to bed bugs' resurgence has shined a light on the nocturnal parasite. Though they may be in the spotlight, the messages are anything but clear.

Bed bugs had not been actively studied for decades until their resurgence in recent years. As such, older studies and new information result in varied interpretations by scientists, medical researchers and pest management professionals about the risks posed by bed bugs, where they come from and how to get rid of them. The majority of the general public remains in the dark about the reality of bed bugs, with many people still considering them a myth. So how are health care professionals to separate fact from fiction? Those in the hospital, health care and long-term care industries have valid concerns about the impact of these pests on their business. As such, it is our intention to address the current state of the debate and illuminate the truth about bed bugs – and how to help prevent them from biting patients, residents and reputations.

MEDICAL PROFESSIONALS MAKE A DIAGNOSIS

In the April 1, 2009, issue of the *Journal of American Medicine*, an article authored by Jerome Goddard, Ph.D., of Mississippi State University, and Richad deShazo, M.D., of the University of Mississippi Medical Center, reviewed 53 previously published articles on the topic of bed bugs. In their analysis of the existing research, Drs. Goddard and deShazo conclude that bed bugs do not transmit communicable diseases, translating into little to no serious health risks to humans. Similar parasites, like ticks, carry pathogens that can be transferred to hosts. According to Goddard and deShazo, previous research strongly suggested that bed bugs do not exhibit the same characteristic.

Though they may not carry pathogens, bed bugs' bites can be a source of serious irritation for some. For those who experience a reaction, the researchers noted the lack of an effective treatment for the bites, which typically cause minor to complex skin reactions and, in rare cases, systemic reactions. Treatments ranging from antibiotics and topical corticosteroids and epinephrine have had varying degrees of impact on the reaction.

The authors also conclude that the management and treatment of bed bugs is extremely difficult. The paper cites a lack of evidenced-based interventions that prevented an infestation or eradicated a population. Drs. Goddard and deShazo essentially positioned bed bugs to be less of a concern to the medical field and squarely in the jurisdiction of pest management.

THE PEST MANAGEMENT PERSPECTIVE

The Environmental Protection Agency, in conjunction with the National Pest Management Association, hosted a National Bed Bug Summit in April 2009 in Arlington, Va. At the conference, professionals discussed the ongoing issues surrounding bed bugs, one of which was Goddard's and deShazo's conclusions published in the *JAMA* article two weeks prior to the Summit.

The consensus of the Summit was that evidence regarding the serious health risks of bed bugs is inconclusive. If existing research indicated that bed bugs facilitate pathogen transmission, it would likely gain the attention of the Centers for Disease Control and Prevention and make the pests a priority research topic. As it stands, bed bugs have only recently been subjected to study for the first time since the middle of the last century, and the observed health implications are mild to moderate.

Some researchers believe that bed bugs have potential allergen and respiratory effects, much like cockroaches. Others point to the sleep disturbance caused by the night-feeding pests, resulting in fatigue and mental health complications. For some, as noted, the bites cause mild to serious skin reactions that result in soreness or itching. Those who experience bites may also feel paranoia about the pests during the day and especially at night. Delusionary parasitosis, in which the person believes he or she is being actively bitten by the insects throughout the day, may be incited by concern about bed bug activity, according to some researchers.

Beyond the potential health implications, bed bugs should be a business concern for health care and long-term care facilities. As an unwanted pest, the very presence of bed bugs is a disturbance to patients and residents. Infestations are common and becoming more so in these health care settings, and when they occur, they evoke – right or wrong – the impression that infested facilities are unsanitary and of low quality. With peace of mind and reputations at stake, pest management professionals believe that attention should be given to developing prevention and treatment strategies.

IN THE FIELD: ORKIN BRANCHES SEEING A MAJOR UPTICK IN BED BUG CALLS

Orkin, LLC recently surveyed its branch locations and found that in 2008 bed bug activity remained consistent or increased over previous years, according to respondents. For those that reported an increase, prevalence of the pests grew by an average of 50 to 75 percent from the previous year, with some branches reporting a 100 percent to 200 percent year-over-year increase in the number of calls to service bed bug infestations. One Orkin location reported two calls regarding bed bugs in 2007 and projects more than 120 service calls this year based on 2009 call volume to date. Another respondent documented a 500 percent increase in cases from 2008 to 2009. Taken together, Orkin branch locations reported more than 500 treatments in hospitals and health care facilities and more than 130 treatments in long-term care facilities related to bed bug infestations. As one respondent noted, "Bed bugs are making a major comeback."

NO BITES DOESN'T NECESSARILY MEAN NO BUGS

In recent research conducted at Orkin's Training Center in Atlanta, Ga., we introduced each of 900 volunteers to one to three bed bugs from a lab colony for a feeding. Volunteers were monitored closely for reactions to the initial bite. Almost immediately, 3.7 percent of participants reacted with mild to serious skin irritation. Within 18 days, an additional 0.8 percent exhibited some level of reaction. In total, fewer than 5 percent of the participants had a reaction to beg bug bites. In the affected group, there were no discernible correlations between the subjects' race, age or gender and their reaction to bed bug bites.

Because so few people seem to react visibly to initial bed bug bites, the presence of visible bite reactions – or the lack thereof – may not be a reliable early indicator of bed bug presence. Instead, it would seem that many hosts will have no reaction when first bitten, leaving bed bugs undetected for a longer period.

Orkin recently witnessed this disconnect first-hand at an independent living facility when we were called to consult on a severe bed bug infestation. The source infestation was a colony of 500-1,000 bed bugs – in one room – in various growth phases. Most of these bugs were found in the resident's bed. Upon further inspection, our Commercial Pest Specialists identified 10 other separate cases of bed bugs in the same facility. It was a severe infestation, but *zero* bite reactions were reported by the facility's residents in the other affected areas. This finding was correlated by research at the University of Kentucky that found that the elderly have a diminished response to skin irritants and are less likely than other age demographics to exhibit a reaction.

In light of the resurgence of bed bugs, Orkin is participating in studies to help identify effective ways to prevent and treat them. In a study at North Carolina State University, Orkin works with researchers to gather samples of different bed bug species and study effectiveness of different treatment methods. Orkin is currently partnering with the University of Kentucky to formally survey victims of bed bug bites in order to identify any trends among the respondents.

THE BED BUG EVOLUTION: FROM CAVES TO COUCHES

The history of the bed bug offers clues to why bed bugs bite people, but don't typically cause us severe health problems.

Bed bugs are thought to have evolved from insects that dwelled in caves, feeding on bats and swallows. When humans in certain parts of the world, especially in colder climates, moved off of the plains and into the same caves, bed bugs seemed to change preferred hosts and began feeding on humans as well. Early cave drawings seem to illustrate man's interaction with the nocturnal pest, depicting people being awoken by tiny, crawling creatures.

Humans are nearly ideal prey for bed bugs. We have less hair than other mammals, which bed bugs prefer. Direct access to skin makes their feeding much easier. Based on historical research, scientists believe the parasite thrives at a temperature between 60 and 70 degrees, so rather than reside on its host, it feeds and returns to the cool, dark hiding places that it favors. More recent research at Virginia Tech indicates that consistently cooler temperatures may expand the lifespan of bed bugs. Human dwellings give bed bugs a perfect combination of a reliable food source and convenient, nearby harborage in cooler spots in mattresses, box springs, behind wooden headboards, in couch cushions and other furniture. Though not rapid breeders compared to many other pests, a bed bug population left untreated can become a critical problem in a matter of months.

Today, beg bugs are one of the few parasites that feed almost exclusively on human blood. This exclusive relationship may be one reason they don't seem to cause disease in human hosts. They may bite the hand that feeds them, but they seem to do so without jeopardizing their food source.

AN OUNCE OF PREVENTION: HOW TO STOP BED BUGS AT THE DOOR

In the fiercely competitive health care and long-term care industries, patient or resident satisfaction is crucial. Bed bug infestations, aside from potential health concerns, can spark complaints about sanitary conditions and lead to long-term reputation damage. Despite the fact that the presence of bed bugs is not an indicator of poor sanitation, pests of any kind are accompanied by a perception of being "dirty." Because prevention is key to avoiding bed bug problems, it is prudent to develop a proactive plan to keep them from entering the facility and train staff to monitor for bed bugs as part of their daily routine.

Prevention has patient rights and provider responsibility implications that should be weighed carefully. When does a prevention measure become a violation of patients' rights? What message does it send to patients? Aggressive policies to control incoming materials or conducting searches of incoming personal items may raise privacy concerns and anxieties. Particularly for long-term care providers, this approach could create a discomforting atmosphere for incoming residents who may already be stressed by a transition from independence to facility living. From the provider's perspective, the question is: what responsibility do you have for keeping bed bugs out through inspections, quarantines and other methods of prevention? Some methods, though effective, can be untenable in the real world.

In a long-term care facility, preventing bed bugs from entering on residents' personal effects is the best way to lower the potential for an infestation. The methods suggested below are effective without taxing staff or alarming residents. Recommendations include:

- **Check mattresses** – Conduct a visual inspection of bedding as it is brought in for evidence of bed bugs.
- **Require mattress and box springs to be encased** – An inexpensive synthetic covering on mattresses and especially box springs prevents bed bugs from reaching the fibrous interior or hiding along edges or under tags. For pests that have already found harborage, the encasement prevents their escape and access to food sources.
- **Perform an inspection of incoming furniture** – Much like bedding, couches, plush chairs and other furniture can easily harbor bed bugs.
- **Utilize monitoring technology** – Equipment that uses CO_2, heat and a kairomone can attract bed bugs out of hiding within two hours. This technology is cost-prohibitive for private use at this point, but is available through some pest management professionals. But smaller, less expensive monitors are in the development stages and may come to the consumer market within two years.
- **Bed bug-sniffing dogs** – Trained dogs are among the most effective detectors of the presence of beg bugs. Many pest management companies are now utilizing these trained canines to help identify infestations.

Hospitals and other health care facilities are typically less conducive environments for bed bugs. Unlike nursing home residents, who stay in one place for extended periods, health care patients enter, undergo treatment and are released. In addition, most clinical beds have metal frames and plastic-covered mattresses, which prevent bed bugs from reaching the porous harborage they seek. As patients come and go, the stringent cleaning practices that prevent cross-contamination also supports a hostile environment for pests and can keep bed bugs in one room from making their way to another.

Although hospitals are less conducive to bed bug infestations, there are areas where patients stay for long periods of time that have the potential for attracting bed bugs. Overnight guests in maternity, long-term care and hospice are more likely to bring luggage and other personal effects. These areas should be more closely monitored during routine cleaning to ensure that bed bugs did not make their way into the facility in someone's luggage. Psychiatric wards where patients are admitted as temporary residents are another hot spot for bed bug activity. A quarterly thorough inspection in these areas will help to identify pests that have found harborage in the furniture or elsewhere in the room.

OUT OF SIGHT, NOT OUT OF MIND: MONITORING & EARLY DETECTION

On an ongoing basis, monitoring and early detection are crucial to preventing bed bugs from taking hold and causing an infestation. A pest management professional can educate your staff on the importance of being aware of the problem and train them to recognize the signs of a bed bugs presence.

As nocturnal pests, bed bugs typically hide during the day, but evidence of their nightly wandering can be found on mattress edges and tags. Small dark brown-colored stains in these areas may be the leave-behinds of bed bugs.

In a long-term care facility or long-term care units in a hospital, integrating bed bug monitoring into regular cleaning routines can help identify problems before they spread throughout the facility:

- **Weekly** – Monitor for evidence when changing the sheets. Check the mattress cover and the edges of the mattress.
- **Monthly** – Inspect the box springs for similar signs.
- **Quarterly** – Conduct thorough inspections of potential harborage locations – behind pictures and headboards and in furniture, sofas or plush chairs.

SEND BED BUGS PACKING: TREATMENT

If routine monitoring uncovers a bed bug problem, contact your pest management professional immediately. Remediation tactics will be less invasive if initiated in the early stages of an infestation.

Non-chemical and environmentally conscious methods:

- **Dispose** – If furniture or other items harboring bed bugs can be disposed of, it increases the chances of a successful eradication.
- **Launder** – For items that can be laundered, wash in hot water with detergent and dry in a dryer. The combination of heat and soap will kill bed bugs and remove any eggs.
- **Heat** – Pest management professionals can use special equipment to heat the room or the room's belongings to the necessary temperature for a sustained period of time that will eradicate any bed bugs in the room. Use dry steam on carpet, mattress edges and cushioned furniture.
- **Freeze** – Due to bed bugs' need for moderate temperatures, cold seems to be as effective as heat. Pest management professionals also have the equipment to cool bed bug harborage areas, which should kill any bed bugs in the space.

A wide-spread infestation possibly affecting multiple locations within the facility will require a more aggressive approach involving chemical treatments. Chemical treatments should only be applied by a licensed, trained pest management professional who can advise you of the best course of action:

- **Fumigate** – A chemical material will kill all pests and leaves no residual. It does require the facility to be completely cleared, which can be a challenge.

- **Non-residual Chemical Treatments** – Alcohol will create a chemical solution that kills bed bugs.

- **Residual Chemical Treatments** – Chemically treat carpet edges, baseboards, furniture, headboards, etc.

Treating for bed bugs does present some challenges. In some cases, the pest can be resistant to chemicals. They may also be repelled by chemicals and be driven to seek harborage elsewhere in the facility after treatment. Sensitivity to the use of chemicals in a health care facility is also a concern and should be discussed with your pest management professional. Insect Growth Regulators, or IGRs, which have been effective in the treatment of other types of pests, appear to be less consistently successful with bed bugs. IGRs use synthetic pest hormones to prevent pests from reaching maturity – thereby preventing subsequent pest activity. IGRs are sometimes part of the bed bug treatment, since they may have some effect on slowing the expansion of a bed bug population in some cases.

Bed bugs exhibit a number of unique characteristics that make them problematic pests: parasites that are almost exclusive to humans; bites that frequently produce no reaction; nocturnal feeders that stay out of sight during the day, making them difficult to detect. The severity of the risk presented to humans is inconclusive. Clearly, further research is needed to define the degree of the threat that bed bugs pose. Until then, prevention and early detection are the best practices.

Health care providers will need to rely on their staff for an effective monitoring and prevention strategy. Working hand in hand with your pest management professional, staff education and cooperation is essential to identifying and reporting potential bed bug infestations. Your pest management professional can educate employees about the pests, harborage points and signs of their presence. They can also train staff on sanitation practices and monitoring activities that will reduce the risk of a bed bug infestation and ensure that if bed bugs do enter your facility, they don't take up residence.

As the debate around bed bug continues to evolve and further research brings to light new information about these pests, the prevention and management practices will also evolve. In the meantime, rest easy with a proactive approach and the advice of a trained pest management professional.