

EVALUATION AND IMPLEMENTATION OF A MINIMAL MONITORING SYSTEM FOR *CIMEX LECTULARIUS* (HEMIPTERA: CIMICIDAE) DETECTION IN LOW-INCOME HIGH-RISE HOUSING

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Abstract The objective of this study was to implement and evaluate bed bug detection systems in low-income, high-rise housing for the elderly and disabled. In a previous study, one, two or four ClimbUp Insect Interceptors BG or the BlackOut BedBug Detectors placed per apartment resulted in 80% to 90% bed bug detection rates over an 8-week monitoring period. For this study, two BlackOuts were placed in most apartments of the buildings used in the previous study. Floor meetings were held for all residents to explain bed bug biology, prevention and detection, and residents were given two monitors to place against their bed and a chair. Residents were to inspect the monitors weekly and wipe them as needed; pest management professionals (PMPs) to inspect quarterly; and housing managers and other personnel to inspect as opportunities arose. Our lab personnel conducted inspections in one building (designated D) at 7–9 months and in other buildings (designated A and B) 22 months after monitor placement. Evidence was lacking to indicate residents were inspecting and reporting infestations. In building D, 11% of inspected apartments had living bed bugs in the monitors, and another 9% had dead bed bugs but had not been treated by PMPs. The apartments in buildings A and B were quickly inspected, i.e., mattresses and the upper surfaces and crevices of upholstered furniture were examined, as were the two monitors. Living bed bugs were found in 8% of apartments and another 2% had dead bed bugs in apartments that had not been treated. Management was unaware of 79% of the living bed bug infestations. Relying on residents to report bed bugs is ineffective and there is a need for a building-wide visual inspection accompanied by monitor inspection.

Key words Bed bug, elderly and disabled housing, BlackOut BedBug Detector, inspection

INTRODUCTION

Bed bug management in low-income, high rises for seniors and the disabled is especially troublesome (Wang et al. 2016). Because introduction of one female bed bug can result in building-wide infestations (Saenz et al. 2012), early detection is essential to slow the spread (Wang et al. 2011). In this study we evaluated two building-wide bed bug detection systems.

MATERIALS AND METHODS

In a previous study, one, two or four ClimbUp Insect Interceptors BG or the BlackOut BedBug Detectors placed per low-income, high-rise apartment for the elderly and disabled resulted in 80% to 90% bed bug detection rates over an 8-week monitoring period (Vail and Chandler 2017). Of these two monitors, we chose to further evaluate the BlackOut in a building-wide detection program because it seemed more durable and did not require re-applying talc. Floor meetings were held from March through August 2014 for nearly all residents (733) in these four buildings to explain bed bug biology, prevention and detection, and to inform them of the new detection program. Residents were given two BlackOut monitors to place against their bed and a chair. Monitors were placed against furniture rather than under legs to prevent resident injury. Our lab personnel placed monitors if residents needed assistance. Residents were requested to inspect the monitors weekly, wipe them with a soft cloth if debris accumulated and to report any suspected bed bugs to their housing manager. In addition, PMPs were to inspect the monitors

quarterly during scheduled apartment inspections. Housing managers and other personnel were to inspect monitors during the annual housekeeping inspection and as other opportunities arose. For the first detection system evaluation seven to nine months after monitor placement, the monitors in the building designated as “D” were inspected and furniture was not. Twenty-two months after monitor placement, buildings designated as “A” and “B” were used for the second detection system evaluation which incorporated the quick inspection technique introduced by Wang et al. (2016). In our evaluation, we inspected the two BlackOut monitors and conducted a quick inspection of the bed and upholstered furniture in each apartment. Sheets were pulled back to expose the mattress and the outer surfaces of the mattress, box spring and frame were inspected. Pillows and the upper surfaces of upholstered furniture were also inspected. Beds and furniture were not flipped. Time spent in each apartment was recorded. Pest management records were reviewed after each inspection to determine which apartments managers knew were infested with bed bugs.

RESULTS AND DISCUSSION

In building D where only the monitors were inspected, we had access to 256 of 277 apartments. At least one monitor was still present in 83% and 78% of the apartments where UT personnel and residents had placed them, respectively. Living bed bugs were found in 27 apartments, dead bed bugs were found in 25 apartments that had not been treated according to pesticide application records, and dead bed bugs were found in another 22 rooms that had been treated in the past. Vacuuming was not part of the bed bug pest management plan in this building. The infestation rate ranged from 11% (apartments with living bugs only) to 29% (apartments with dead or living bed bugs in monitors), not much different from the results of an earlier inspection in 2013/2014 in which 31% of the apartments were infested. Because the contracted pest management company changed shortly after our inspection, we could not determine which apartments had bed bugs according to managers.

In buildings A & B where we quickly inspected the bed and upholstered furniture as well as the BlackOut monitors that had been placed 22 months prior, we had access to 245 of 249 apartments. We spent 3 ± 1.2 (mean \pm SD) minutes per apartment, not including time spent opening doors and moving between apartments. Eighty-three percent of the apartments still had at least one monitor present. Only 10% of the monitors were free of debris, which could indicate the resident or others were inspecting regularly. We replaced 104 monitors because they were missing and 39 because they were too “dirty” to be effective. Living bed bugs were found in 19 apartments, dead bed bugs were in six apartments that had never been treated and in 17 apartments that had been treated in the past. In this case, bed bug infestation rates ranged from 8 to 17% compared to 27% in 2013/2014.

The manager of this building diligently checked his pest management records, responded to housekeeping needs reported by the PMP and was seen as an authority figure by the residents. The PMP with the most currently contracted company was a seasoned professional. Incentives encouraged residents to attend an annual bed bug presentation by the contracted pest management company. The manager’s and residents’ active involvement and the PMPs experience were some of the reasons the infestation rates were declining in these two buildings. Even under these conditions, management was only aware of four active infestations in the building which indicates 79% of infestations went undetected. This assumes the apartments with dead bed bugs did not have an active infestation. If the apartments with dead bed bugs lacking treatment were included, management would have missed 84%. This combination of a quick visual inspection along with inspection of two monitors already in place is a slightly different technique compared to Wang et al. (2016). In their study, a quick visual inspection of the bed and upholstered furniture was conducted in each accessible apartment. An average of nine monitors under the legs of beds and furniture were only placed in an apartment when bed bugs were suspected but not found.

CONCLUSIONS

The results of this study illustrate the ineffectiveness of relying on residents to report bed bugs to management. Building-wide inspections used in conjunction with bed bug monitors could detect all, or nearly all, bed bug infested apartments at once to prevent infestations from spreading. We present the effective use of two monitors placed per apartment followed up with building-wide quick visual inspections up to 22 months later.

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