USING PASSIVE MONITORS TO REDUCE GUEST COMPLAINTS ABOUT THE COMMON BED BUG (HEMIPTERA: CIMICIDAE) IN THE HOSPITALITY INDUSTRY

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Introduction

Bed bugs have been parasites on planet Earth long before we established as a dominant species and have shown remarkable abilities to adapt and survive[1]. In the last two decades their resurgence has reached every continent. Above all sectors the one with the greatest financial impact from bed bugs are Hotels[2], especially since the source of the issue is most commonly the customer. The only way to prevent bed bugs from getting into any location is to close it and not allow people in, something that obviously not practical with a Hotel or accommodation provider.

Since 2010 we have advocated for a early detection led approach using Passive Monitors to ensure infestations are identified while lighter and easier to treat. However, such long-term studies are not conducive to lab testing, it would take years to gain as many replications as a medium sized hotel gains in a week. Through long term data collection, we have been able to observe the impact of monitoring on guest complaints and the operational efficiency of hotels with regards bed bug infestations.

Materials and Methods

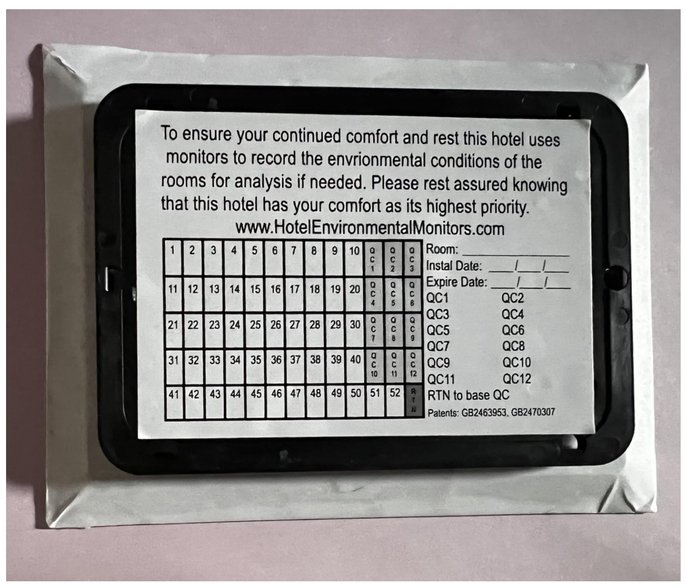
Four commercial sites were selected for long term monitoring using Passive Monitors (patents GB2463953, GB2470307). After screening and treatment one monitor was installed at the head of each bed in the hotel using the published protocol [3]. The previous levels of infestation were established by checking their records and through observations during the screening and installation.

Hotel ID	Number of beds in hotel	Number of infestations in previous year	Checking interval	In house or external checks
A	187	6	Monthly	External
B	240	50	Monthly	External
C	336	4	Weekly	In house
D	40	5	Weekly	In house

Table 1: Number beds, infestation in the previous year, checking interval and if those checks were conducted in-house of externally for the four test sites A-D.-

In house checks were conducted by the hotels trained housekeeping staff with a recommended second person monthly quality assurance which was also logged on the product label. External checks were conducted by our trained staff who with experience could screen 250-300 monitors per day. The system also received a final quality assurance check when the monitors were replaced on an annual basis. Sites A, B and C started in 2012 with site D starting in 2016.

Monitors (Pic 1) provided to hotels are labelled with branding for www.HotelEnvironmentalMonitors.com . The grid allows tracking of the task as all rooms should match at the end of each week.
Data was collected and analysed in MS Excel.



Pic 1: Image of an unused Passive Monitor

Results and Discussion

The table below illustrates that every location detected infestations of bed bugs after the system was installed, most of these were prior to guest complaints and none of the infestations resulted in spread to other rooms on site. Infestations were confirmed prior to eradication using the Cimex Eradicator (Polti, Milan, Italy) and Diatomaceous Earth (DE – Bed Bugs Limited, London, UK).

	Number of infestations detected			
Year	A	B	C	D
2012	0	20	0	
2013	0	1	0	
2014	0	0	0	
2015	1	1	0	
2016	0	1	0	0
2017	2	1	0	1
2018	1	0	1	0
2019	0	4	1	0
2020	0	2	4	0
2021	0	0	1	0
2022	1	1	1	0
2023	0	1	0	0
2024	0	0	3	0

Table 2: Number of bed bug infestations detected in each of four commercial sites (A-D) between 2012 and 2024.

Site B clearly had legacy issues which continued into first year. The baseline was adjusted pro-rata with Site A as 50 infestations per year was artificially high and most likely an indication of previous treatment failures.

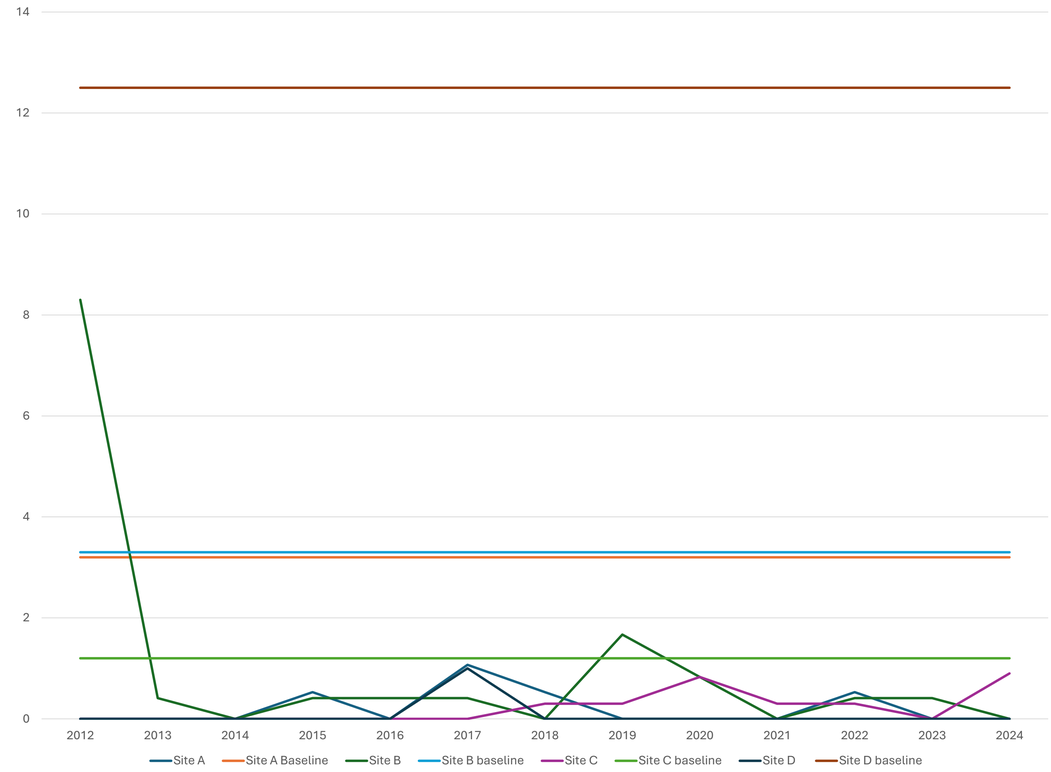
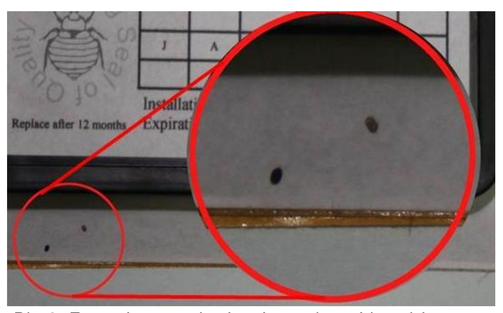


Chart 1: Comparison of detection of bed bugs by Passive Monitoring (Table 2:) as percentage of rooms for four hotel sites versus the historical baseline see Table 1:

In most situations the infestation consisted of only a few bed bugs, in hotels that checked weekly (sites C and D) monitors were often returned with unhatched eggs inside. Even in the monthly checked hotels (Sites A and B) the Passive Monitoring system managed to detect bed bugs while it was still contained to a single room only.
Guest complaints dramatically reduced on all sites because of early detection with site C achieving zero guest complaints in twelve years with an average of 90.000 guests per year. Sites A and B only received complaints when they hosted long term guests.

Pic 2: Faecal traces circled on the detection skirt.



Pic 3: Faecal traces in the detection skirt with magnified detail.

Video

Pic 4: QR code to video showing hundreds of tripped monitors.

Site D had the greatest apparent benefit from the system reducing from five cases per year in previous years to only a single introduction in the following nine years, an 80%-100% reduction in activity. Given that all sites saw a reduction there is a possible paradox where the process of monitoring is impacting the probability of introduction in the same way an organisation that has a culture of health and safety at work is subject to fewer accidents and injuries. While the sample is not large enough to calculate an average reduction it is clear that all sites observed an overall reduction.

Conclusions

Routine proactive Passive Monitoring for bed bugs can achieve early detection, timely treatment/management and therefore reduce guest complaints within the hospitality industry helping to mitigate the risk of the impact of bed bugs on the organisations reputation and future profits.
While it might initially seem like a wild claim that the correct combination of "processes, procedures and product" [4] can reduce the infestation rate of hotels the data clearly shows this.

Further Research

We are keen to explore effect, additional avenues with our research including:

- Monitoring of larger projects
- Qualitative research into the reduction of stress within the workplace when effectively monitoring for bed bugs
- Exploring the quantum effect we see with Passive Monitoring
- Quantifying the reduction in carbon emissions of this approach versus traditional methods

References

1 - Bedbugs Evolved before Their Bat Hosts and Did Not Co-speciate with Ancient Humans Roth, Steffen et al. Current Biology, Volume 29, Issue 11, 1847 - 1853.e4
2 – Scarpino SV, Althouse BM. Uncovering the hidden cost of bed bugs. Proc Natl Acad Sci U S A. 2019 Apr 9;116(15):7160-7162. doi: 10.1073/pnas.1902404116. Epub 2019 Mar 22. PMID: 30902893; PMCID: PMC6462087.
3 – Hotels chapter of Advances in the biology and management of the modern bed bug Wiley Press 2016
4- Personal communication with Stephen Doggett during a field visit to London 2015