



PESTS MANAGED

EVALUATION OF BEDBUG PREVENTION
AND ERADICATION STRATEGIES
AT INDWELL 2011-2014

ABSTRACT

Bedbug occurrences continue to rise in North American cities, disproportionately affecting people living in poverty. The high cost of treatment makes pest free living a challenge for many. This report describes the development and results of implementing an integrated pest management strategy with an emphasis on tenant education and proactive bedbug unit checks.

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“In my last apartment I paid my money for my rent and then as the key was handed over, my landlord told me I had bedbugs. They never did anything about it; I hated living there.”

~ Indwell Tenant

Bedbug Education Session July 10, 2012

Anyone who has experienced bedbugs would prefer to be rid of the experience and never have it again. Many people who live with economic or health challenges lack access to effective pest control technologies or basic knowledge of how to address prevention, detection and eradication of bedbugs. Their circumstances also predispose this population to accessing housing that is at high risk for bedbug infestations. Bedbugs are an issue of social justice; a pest resurgence that disproportionately affects people living in poverty or with disabilities.³

In Ontario, pest control is the responsibility of the landlord, however, like the tenant quoted above, responses to this obligation vary from diligent and effective action to outright neglect of responsibility. Tenants who are uninformed or, more likely, fearful of losing their housing attempt to cope with these troublesome and difficult-to-eradicate pests without support. Some, frustrated with their inability to live pest free or have a good night's sleep, simply walk away from their housing, leaving their belongings behind and seeking shelter elsewhere.

This report is a case review describing the implementation of an integrated pest management strategy within Indwell's supported housing communities between 2011 and 2014 (end of August). While there is literature describing integrated pest management frameworks, eradication activities, and description of the social and clinical outcomes of bedbug infestation, there are few reports on the experience of implementing a strategy or findings from its implementation. This report fills a knowledge gap related to the outcomes of implementing integrated pest management strategies.

What is Indwell?

Indwell is a non-profit charity that develops and operates affordable housing and supports in Hamilton and Woodstock, Ontario, Canada. During the period of this review at least 220 units of housing were in operation primarily serving people with histories of homelessness, precarious housing, mental health issues and other challenges. Tenants live in a range of housing options from group homes to independent apartment units. Supports for maintaining housing vary but all tenants have access to Indwell staff. Support services are focused on facilitating housing stability and building community.

Indwell has operated for 40 years and continues to expand its services and is presently branching out to other Ontario communities.

“In one afternoon, the organization’s impression that bedbugs happened elsewhere was completely shattered.”

Background:

FIRST CONTACT WITH BEDBUGS AT INDWELL

Prior to 2011, Indwell’s experience with bedbugs was sporadic and usually entailed assisting a tenant to rid their belongings of bedbugs before moving into a unit. For all intents and purposes we believed it was something that happened elsewhere.

August 2011

In a group home, an insect was noticed crawling on a tenant. It was not immediately apparent to anyone that it was a bedbug. Once identified, further inspection of the tenant’s unit revealed hundreds of bedbugs in a variety of places in the unit. Inspection also revealed that the creatures were found in adjacent units and units above and below the original tenant unit. In one afternoon, the organization’s impression that bedbugs happened elsewhere was completely shattered.

Treatment of the affected tenants and units began immediately. However, full eradication of the outbreak was not achieved until November of 2011 and with considerable financial impact. The cost of unit treatments, both conventional sprays and novel heat treatments, ran into several thousand dollars. Staff overtime, devoted primarily to assistance with unit preparation, laundry and unit inspections was a significant cost. The emotional impact on staff and tenants was palpable, and in the case of staff, measurable. Between August and November 2011, five staff were replaced in the program, citing they were unable to cope with the idea of working with bedbugs or fearful of bedbugs.

Analysis

The 2011 bedbug experience caused considerable concern for our organization. Analysis of the situation included the following points:

Lack of knowledge: Managers, staff and tenants lacked a clear and uniform concept of bedbugs and how to deal with them. Lack of knowledge meant that people often acted out of fear or acted erroneously based on misinformation.

Lack of teamwork: A lack of information often meant that people acted differently based on the information they had versus having a shared understanding of the best way to proceed in tackling the problem.

Lack of skills: For many it was their first encounter with a bedbug. Therefore skillful searching for and detection of bedbugs was lacking. Furthermore, when bedbugs were found each instance was often treated differently, often exacerbating the problem.

Loss of community cohesion: Fear, lack of knowledge and a lack of skills meant that people who were directly affected by bedbugs were treated differently. There were instances of tenant stigmatization by fellow tenants and on occasion by staff.

Cost: It was very clear that reacting to a significant bedbug occurrence was costly and such occurrences were to be prevented if we were to maintain tenant housing stability and sustain support services.

Based on this analysis we began the process of developing a solution that would meet all of these points.

“(We) lacked a clear and uniform concept of what bedbugs are and how to deal with them. Lack of knowledge meant that people often acted out of fear or acted erroneously based on misinformation.”

Creating a Solution

Our process involved five steps:

Step 1:
GET KNOWLEDGE:
A BRIEF LITERATURE REVIEW

Step 2:
GATHER ASSETS

Step 3:
PLAN

Step 4:
DESIGN

Step 5:
IMPLEMENT

Step 1: GET KNOWLEDGE: A BRIEF LITERATURE REVIEW

The presence of affordable, comfortable and safe housing is a social determinant of health. Many of us enjoy the capacity to regulate our living environments for heat, cooling, cleanliness and the absence of nuisance pests in our home and this contributes to our sense of wellbeing. The lack of such capacity or denial of this capacity impacts health and wellbeing negatively.

The bedbug is a hardy, biting insect that feeds on human blood and favours environments where humans congregate in higher densities. Bedbug infestation is considered to be on the increase in many North American Centres.^{1,6,9,11,12} The high density nature of affordable housing is associated with high rates of bedbug occurrences in housing occupied by the people least able to afford effective bedbug treatment.^{3,5,9,16} In Hamilton, reports of bedbug infestation in social housing included up to 50% of units in buildings.⁵

The health effects of bedbugs are beginning to emerge in the literature. While not considered carriers of disease, there is evidence that bedbug infestation has a negative impact on human health.^{1,16} Bedbugs can produce allergic reactions to their bites and there are incidences of bites becoming infected.^{2,6} The mental health effects of bedbug infestation include increased anxiety, poor sleep and exacerbation of mental illness symptoms related to increased stress.^{7,9,13,15,20} Combine descriptions of the clinical effects of bedbug infestation with interviews with anyone who has experienced bedbugs, the conclusion can be drawn that bedbug occurrence is more than a nuisance and is not benign.

Options for effective treatment of bedbugs are few. Over the counter preparations are ineffective¹⁰ and single treatments by a pest control expert exceed the monthly living allowance of people living on social assistance. Large scale pest control initiatives are expensive for facility operators. Local, anecdotal reporting suggests that many people living in high density housing experience a poor response from landlords in controlling bedbugs. Conversely, there are some landlords who do offer considerable supports, but a lack of tenant knowledge, reporting of bedbugs or compliance with treatments plays a role in a continuance of a bedbug infestation.

In addition to identifying information about bedbugs and what does not work we identified grey literature that seemed promising. Woodgreen, a housing organization in Toronto, published a bedbug manual in 2008.¹⁹ Foundational to the strategy is the relationship between the landlord and the tenant in achieving detection, reporting, and eradication of bedbugs where they are found. The concept of Integrated Pest Management was seen by our team as the most promising and compatible approach to managing future bedbug occurrences.

In summary, bedbugs are more than a nuisance. They have an impact on the quality of life of our tenants and on our ability to maintain pleasant facilities. For Indwell, pest management became more than a cost or an inconvenience; it became core to delivering our mission of creating affordable housing communities supporting people seeking health, wellness and belonging.

Step 2: GATHER ASSETS

An effective solution in our context is one that can be sustained. As an organization with limited resources we recognized that our intervention needed to build on the key strengths and assets we already had. These included:

- A Relationships with our tenants: Our model of practice is based on supportive and trusting relationships between our staff and tenants. Any solution had to include use of relationships.
- B Our tenants: We immediately recognized the value of including our tenants as active partners in a bedbug solution.
- C Partnerships: We had an existing partnership with McMaster University School of Nursing. We recognized the opportunity to create a bedbug solution that involved students engaging in a learning experience. We have an excellent working relationship with a pest control expert who, in addition to providing eradication services, was willing and able to partner with us in developing a process.
- D Policy and staff training: We saw the establishment of a policy and training as a real opportunity to quickly establish a normative and consistent way of preventing bedbug occurrence.
- E Staff involvement: We recognized immediately that full participation and the interest, gifts and talents of each staff member were part of developing and implementing a long term solution.

Step 3: PLAN

Planning our intervention began with establishing clear outcomes. Any solution to managing bedbugs had to achieve the following outcomes:

- A Bedbugs are to be detected early; we wanted any new occurrences to be identified before the insects could establish large colonies.
- B Treatment is effective in eradicating the occurrence; where an occurrence was identified, unit preparation must allow for the most thorough application of the treatment and must correspond with the best practice, i.e. two treatments delivered within a 21 day span.
- C The number of units affected by bedbugs at any given time could not exceed 5% of all housing units. In other words a 95% bedbug free status of units was established as the *minimum* standard.

Achieving each objective combined our assets and incorporating key elements of Woodgreen's Integrated Pest Management strategy. We set a number of goals and targets:

- D We wanted to ensure that every tenant was aware of bedbugs in detail and understood that they had a responsibility to report any signs to staff on discovery.
- E Every tenant needed to know that Indwell has a no fault, no blame policy with respect to bedbugs to ensure consistent and open early reporting.
- F We wanted at least 75% of tenants engaging in their own regular unit checks for bedbugs in addition to establishing a regular schedule of staff and tenants checking units.
- G Every tenant received the same instructions and support for preparing their unit in the event that bedbugs were detected.

Step 4: DESIGN

Using our goals and anticipated outcomes, we developed a solution that we believe built on our assets and in particular focused on using a relational approach to the challenge of bedbugs. The solution focused on creating dialogue, sharing knowledge and direct skills teaching. We established a regular schedule of unit checks that varied in frequency depending on the facility. For example, group homes are by definition a high risk environment owing to their density, and therefore weekly unit checks were required. Some of our apartment programs required quarterly or twice yearly checks and other programs warranted more frequent checks.

All tenants were to be given appropriate notice of impending checks.

We developed educational materials and planned both group-based and individual events. Focus of education was on providing quality information about bedbugs and their eradication. Table 1 describes the content areas covered and the anticipated outcomes.

Using our partnership with the university we developed a community health placement opportunity for student nurses. The students were given the opportunity to develop educational strategies and work directly with tenants. This enhanced our capacity to reach more tenants quickly.

We developed a standardized work sheet for unit preparation in the event of discovery of bedbugs.

Table 1: Core content of educational outreach and anticipated outcomes

Content Item	Method of Delivery	Target Audience	Anticipated Outcome
Bedbug Identification	Printed matter Power Point Dialogue	Staff Students Tenants	1 Everyone can identify and differentiate a bedbug. 2 Everyone can identify signs of bedbug activity.
Bedbug Life Cycle	Dialogue Power Point	Staff Students Tenants	1 Everyone understands the relationship between bedbug behaviour and corresponding changes in human behaviour 2 Everyone understands the underlying principles of bedbug treatment.
No Fault Policy	Dialogue Printed Material	Staff Students Tenants	1 Early reporting of bedbug activity. 2 Open communication about bedbugs.
Preventative Behaviours: • How to do a unit check • How to report • How to avoid bringing bedbugs into the home	Power Point Digital Media Active Demonstration One to One Modelling and Participatory education	Staff Students Tenants	1 Increased frequency of independent unit checks by tenants. 2 Consistency of behaviour across all groups. 3 Earlier reporting. 4 More effective treatment.
Containment and Eradication	Power Point Dialogue Printed Matter	Staff Students Tenants	1 Elimination of transfer of bedbug colonies between units. 2 Elimination of furniture scavenging or other scavenging behaviours. 3 Consistency of unit preparation. 4 Full compliance with unit treatment regimen.

Step 5: IMPLEMENT

Staff training sessions on the new Integrated Pest Management policy were written. Regardless of position in the organization, all managers and staff received training in bedbug recognition, life cycle, principles of treatment, containment, unit preparation and inspection. The objective was to ensure that there would be no deviation from our strategy. We stated that there would be no return to an “older way” of doing things; bedbug prevention and eradication was now a standard operating procedure.

The staff training discussions were an excellent opportunity for addressing concerns, fears and interpretations of procedure. One example was the issue of protective equipment. Initially, staff who had little knowledge of bedbugs or their behaviour were advocating for the use of gown and booties when working in bedbug identified units. The sessions clarified staff understanding of bedbug behaviour to a point where gloves were understood to be necessary but other equipment could pose containment risks. It was an excellent opportunity to discuss the stigma that over identification of a unit or excessive protective equipment would create.

In the fall of 2011 we began organizing group-based educational activities with tenants. Sessions were semi-formal and designed to encourage discussion among tenants and clarify information, eliminate stigma and most importantly create understanding that, as a landlord, we were interested in our tenants enjoying pest free units and took our responsibility to do so seriously. Refreshments were served and where possible events were given a fun theme. The best example was a session called “*Creepy, Crawly Halloween: Everything You Wanted to Know about the Bedbug.*”

Sessions were co-developed between staff and nursing students and eventually included tenant inputs. Each session was modified to meet the specific needs of the facility it was delivered in and also took the functional capacity of the tenants into account. The sum result of this activity was the development of a rich bank of educational resources to draw from. Tenant involvement in the process evolved consistently to the point where, by the fall of 2012, there were examples of tenants co-facilitating events.

Concurrent to group-based sessions we engaged in an intensive process of regular unit checks with tenants. Appropriate notice was given to tenants and at the specified time each apartment unit was visited by a staff person, or a team of a staff person and a student nurse. In addition to performing a thorough bedbug check the visits were used to provide education, clarify policy and encourage tenants to participate in the check and to perform their own check.

If a bedbug was discovered it was an immediate opportunity to work with the tenant on unit preparation and to provide support and reassurance that the presence of a bedbug was not their fault. Unit checks remained the most effective method of clarifying the relationship that we have with the tenants; we were interested in their enjoyment of a pest free unit and worked with them to achieve it.

Unit checks continue regularly while educational sessions are held by tenant request. At present, one to one education seems more effective as the majority of tenants are conversant in bedbug facts and at this stage are unlikely to attend a group session.

Outcomes

70% of our tenant population participated in either group or individual training. Tenants who chose not to participate in the education did consent to regular unit checking. Nursing students individually contributed over 3,000 hours to direct education, unit checks and ongoing curriculum development over a three year period. Staff accompanied students in completing checks, and in combination with tenant initiated detection, it is believed that high density/risk units received weekly or bi-weekly bedbug checks. Individual apartments received three month then six month staff-led checks, but tenants reported augmenting staff checks with their own.

In initiating the intervention we sought to address a number of key outcomes arising from the first 2011 bedbug experience. These outcomes are the key questions to determining the effectiveness of our intervention. Tables 2, 3 and 4 on the next page describe the results achieved in the program and their related costs.

“Indwell set a target of maintaining 95% of its units as bedbug free. Over the 36 month period of the evaluation the yearly average bedbug free rating ranged from 98% to 99%. The average number of units affected by bedbugs per month during the evaluation was 3.6 units per month. There were several months where no bedbugs were reported in any units, one location reporting no bedbugs for 12 consecutive months. The highest number of reported bedbugs across all Indwell programs in one month was 7 units in 2013 or a 3% occurrence rate for that month only.”

Table 2: Outcomes of the Bedbug Intervention

Goal	Outcome	Contributing Factors	Impact
Maintain a bedbug free unit rate of 95% or higher.	98% average bedbug free rate maintained.	Proactive checking. In some instances tenants have found one bedbug in their unit and on inspection that was the only bug.	Most tenants enjoy their units without bedbugs. Most tenants who did have bedbugs were able to solve the problem with one standard treatment.
Increase level of knowledge about bedbugs.	Occurrences are treated rapidly. Tenants have become leaders in this regard, with some tenants co-facilitating education sessions or speaking to neighbours about bedbugs.	Full inclusion of tenants in every aspect of implementing the policy. Recognition that tenant buy-in was the means to ensuring interest and compliance.	Staff know what to expect and are proactive in taking action on bedbugs. Consistency from staff and tenants in applying the strategy.
Improve teamwork	Bedbug prevention is understood as a partnership between tenants and staff. Staff teams work cohesively and there is a high consistency of approach to the challenge of bedbugs.	Full inclusion of tenants in the process of education. Full disclosure of rights and responsibilities with respect to pest control.	For most tenants and staff regular bedbug prevention is an accepted part of living at Indwell.
Build Skills	Tenants are reporting bedbug evidence. Staff are identifying bedbugs at early stages of an occurrence. Room preparation for treatments are complete before the pest control professional arrives.	Direct skills training. Team approach reinforces new skills that seem to work. There is a lot of discussion and creativity employed.	Most bedbug occurrences are minor in scope and effectively managed with one treatment cycle.
Build Community Cohesion	Tenants have adopted leadership roles within their buildings and have become adept at educating their neighbours. There are occurrences where tenants are reinforcing the message that bedbugs can happen to anyone with their fellow tenants	A matter of fact non-judgemental approach. No posted signage or other identifying signals that bedbugs are present. Inclusion of tenants in the discussion of improving our response to bedbugs; co-development of our response.	Bedbugs are a matter of open discussion in our communities. Discussion is focused on successfully eradicating bedbugs.

Table 3: Cost Analysis: Treatment and Prevention

Cost Analysis*			
Year	Unit Treatment Cost (Per Unit Per Month)	Total Number of Units Operated by Indwell	Prevention Program Cost (Staffing)
2011 (5 months)	\$11.04	216	\$3.82
2012	\$5.96	227	\$2.29
2013	\$6.99	231	\$2.25
2014 (projected after 8 months)	\$3.53	260	\$2.00

* Cost of treatment and prevention is spread across all units in operation.
 * The table does not show the number of units that were treated or affected by bedbugs.

Table 4: Cost Impacts (Proxy Value)

Cost Impacts (Proxy Value)	
Item	Proxy Value
Occupancy income lost directly to bedbug infestation (2012-2014)	\$0 lost
Student involvement in initial unit checks and development of educational resources (2012-2014)	\$23,400.00 per year (in kind) (added value) (\$8.50 per unit per month)*

* Student nurse involvement is complete. It was invaluable to us during the initiation and development phase of this initiative.

Cost Analysis Learning

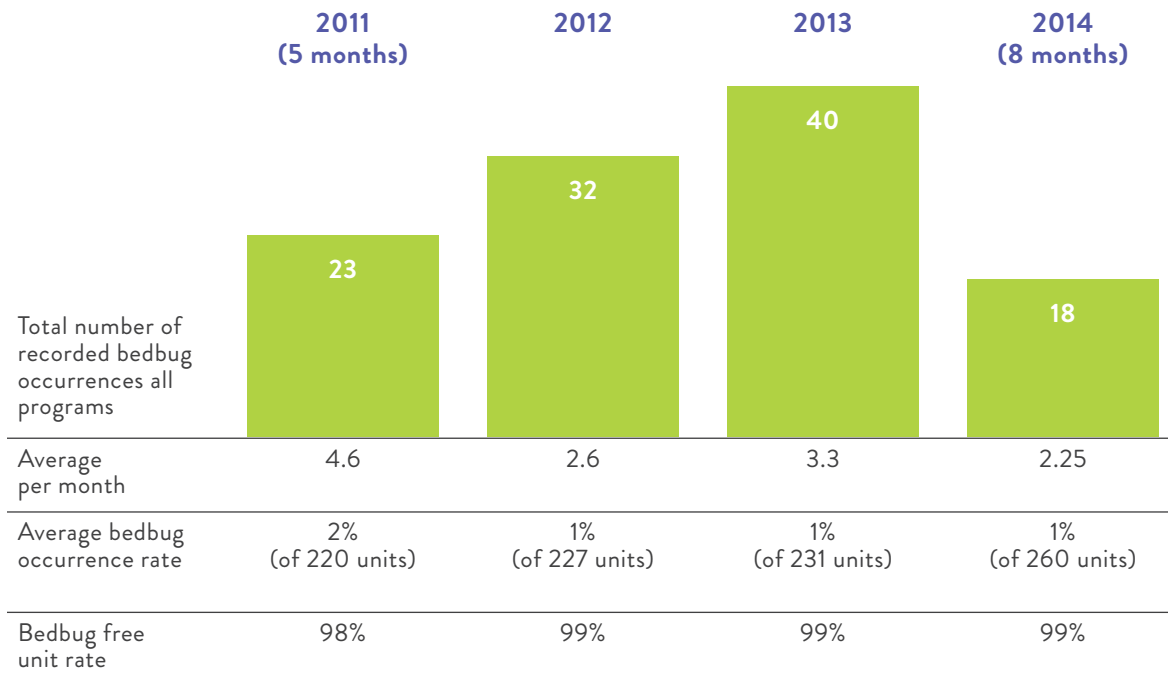
The costing data taught us a number of things:

- 1 Treating a unit will always cost some money: We have maintained a high rate of bedbug free living in our housing units over the past three years. Frequent checking of units equates to more frequent discoveries of bedbugs, albeit few bedbugs per discovery. It is preferable to treat a small occurrence rather than a large occurrence.
- 2 More investment in tenant supports may further reduce treatment costs: We noticed that while most units are treated and remain bedbug free, there are some units that are more difficult to keep bedbug free. Adding supports or effectively eliminating treatment in units that seem to have frequent re-infestation will further reduce treatment costs through time.
- 3 The cost of regular staff prevention has not exceeded the cost of treatment: While we continue to pay for treatments of individual units, we maintain that the relatively small constant cost of prevention has limited the spread of bedbugs to other units. We anticipate that this trend can continue.
- 4 Reaction to bedbugs is more expensive than a proactive approach: 2011 was our most expensive year for bedbug treatment so far. That cost is a reflection of eradicating a multiunit infestation at one location and reacting to it versus more controlled costs associated with going out and finding bedbugs.
- 5 The value of the investment exceeds its cost: As noted in Table 4, there are a number of additional considerations for assessing the value of this intervention. Not experiencing lost income from units related to bedbugs is of tremendous value. Consider that in 2013 we spent a total of \$9.24 per unit per month in treatment and prevention to maintain over 99% occupancy. No one left their unit or ended their tenancy. Using our 95% pest free target as a guide in the same year, a 5% vacancy rate related to bedbugs for one month carries an approximate potential cost of \$23.95 per unit per month in lost revenue; active investment in bedbug prevention and treatment helps our bottom line.

Bedbug occurrences based on billing information

Review of the numbers of bedbug occurrences (Table 5) demonstrates that most of our efforts have been towards preventing large-scale occurrences in our buildings. While treating units and helping tenants to prepare to eliminate bedbugs where they occurred was labour intensive, the bulk of the work was directed towards containment and preventing, with outstanding results. We could not have asked for better.

Table 5: Bedbug Occurrences for All Programs



Discussion

The mission of Indwell is to create affordable housing communities that support people seeking health, wellness and belonging. That mission tells us that what we are doing is more than property management. Pest free living is more than a value added service; it is core to providing opportunities for health and wellness. That being said, to be an operationally sound practice, bedbug prevention has to be effective as a property management practice as well.

We cannot afford empty units or unhappy tenants. A proactive and assertive approach to bedbug management has been part of maintaining a consistently high occupancy rate. Our experience has demonstrated that investment in a task that seems mundane (pest control) has high impact on the living experience of our tenants. No one likes bedbug treatments and no one likes doing unit inspections or reading about bedbugs, but few people would trade those experiences for living with bedbugs in their units.

That fundamental desire for pest free living in combination with the relationships we have with our tenants, remain the most valuable assets we have in combatting bedbugs. The fact that we already possessed positive working relationships with many of our tenants enabled the facilitation of a no fault/no blame approach; it was not seen as something new or unfamiliar to our tenants. Our tenants trust in our capacity to follow through on our commitments to swift and effective unit treatment. Finally, our relationships meant that we could utilize a pre-existing condition of community which made the implementation of group education both fun and familiar; tenants were already accustomed to gathering and having community discussion.

The value of our relationship with our pest control professional and other support services cannot be underestimated. Tenants were enabled to inquire directly about unit treatment because the pest control professional was invited to and attended some of the education sessions. On one occasion tenants received a direct demonstration of the moving of furniture in preparation for a spray; tenants had context for

following through on preparation instructions. Tenant education materials and protocols were co-developed between staff and the pest control professional. Having an active partnership also meant the pest control professional trusted our work and knew that units were well prepared. Choosing one service provider and developing a working relationship was integral to the success of this initiative.

“No one likes bedbug treatments and no one likes doing unit inspections or reading about bedbugs, but few people would trade those experiences for living with bedbugs in their units.”

The use of student nurses had a number of outcomes. Students received direct firsthand knowledge of the impact of bedbugs on tenant enjoyment of their units and their wellness. Student nurses identified discrepancies between what they were seeing in the lives of tenants and the language of current policy on bedbugs. Their observations affirmed other observations made in the literature regarding the perceived health effects of bedbug occurrences.^{1,2, 5, 6, 7, 9, 13, 14} Students found the clinical placement experience affirmed what they were learning about social determinants of health and the implementation of community health education practices.

Finally, this experience showed us the value of a proactive approach to pest management. It is unlikely that bedbugs will disappear anytime soon, and our approach taught us to appreciate this fact and take control of the situation. Our effectiveness seems related to the fact that we acknowledge the challenge and are prepared to tackle it directly. Equipping our staff and tenants with knowledge and skill to find and eliminate bedbugs has increased our confidence that our tenants may continue to experience bedbug free living and that having a 100% bedbug free target is feasible and achievable.

REFERENCES

1. Aultman J. Don't let the bedbugs bite: The cimicidae debacle and the denial of healthcare and social justice. *Med Health Care and Philos.* 2013; 16(3):417-427. http://resolver.scholarsportal.info.libaccess.lib.mcmaster.ca/resolve/13867423/v16i0003/417_dltbbtdohasj. doi: 10.1007/s11019-012-9404-x.
2. Barnes E, Murray B. Bedbugs: What nurses need to know. *American Journal of Nursing.* October 2013:58-62.
3. Eddy C, Jones SC. Bedbugs, public health, and social justice: Part 1, A call to action. *Journal of Environmental Health.* 2011; 73(8):8-14.
4. Fragomeni C. Bedbugs have social housing tenants under siege. *Hamilton Spectator.* 2013. Available from: <http://www.thespec.com/news-story/2176401-bedbugs-have-social-housing-tenants-under-siege/>.
5. Gimenez S. Don't let the bedbugs bite: Successful strategies for PHAs. *Journal of Housing & Community Development.* 2010; 67(2):23-24. <http://search.ebscohost.com.libaccess.lib.mcmaster.ca/login.aspx?direct=true&db=ssa&AN=510991571&site=ehost-live&scope=site>.
6. Goddard J, de Shazo R. Bedbugs (*cimex lectularius*) and clinical consequences of their bites. *Journal of the American Medical Association.* 2009; 301(13):1358-1366.
7. Goddard J, de Shazo R. Psychological effects of bedbug attacks (*cimex lectularius* L.). *Am J Med.* 2012; 125(1):101-103. doi: <http://dx.doi.org.libaccess.lib.mcmaster.ca/10.1016/j.amjmed.2011.08.010>.
8. Huntington MK. When bedbugs bite: Treating bedbug bites is straightforward; helping patients control and even prevent future infestations is another matter. here's how you can help. *Journal of Family Practice.* 2012; 61(7):384+. http://go.galegroup.com.libaccess.lib.mcmaster.ca/ps/i.do?id=GALE%7CA297715369&v=2.1&u=ocul_mcmaster&it=r&p=AONE&sw=w&asid=f8aa83acc8859d741c386c273993b77f.
9. Hwang S, Svoboda TJ, De Jong I, Kabasele KJ, Gogosis E. Bedbug infestations in an urban environment. *Emerging Infectious Diseases.* April 2005; 11(4):533-538.
10. Jones SC, Bryant JL. Ineffectiveness of over-the-counter total-release foggers against the bedbug (heteroptera: Cimicidae). *J Econ Entomol.* 2012; 105(3):957-963. http://resolver.scholarsportal.info.libaccess.lib.mcmaster.ca/resolve/00220493/v105i0003/957_iootfatbbc. doi: 10.1603/EC12037.
11. Levy Bencheton A, Berenger J, Del Giudice P, Delaunay P, Pages F, Morand J. Resurgence of bedbugs in southern France: A local problem or the tip of the iceberg? *Journal of the European Academy of Dermatology and Venereology.* 2011; 25(5):599-602. http://resolver.scholarsportal.info.libaccess.lib.mcmaster.ca/resolve/09269959/v25i0005/599_robisfottoti. doi: 10.1111/j.1468-3083.2010.03804.x.
12. Ralph N, Jones H, Thorpe L. Self-reported bedbug infestation among New York City residents: Prevalence and risk factors. *Journal of Environmental Health.* 2013; 76(1):38-45.
13. Rieder E, Hamalian G, Maloy K, Streicker E, Sjulson L, Ying P. Psychiatric consequences of actual versus feared and perceived bedbug infestations: A case series examining a current epidemic. *Psychosomatics.* 2012; 53(1):85-91. doi: <http://dx.doi.org.libaccess.lib.mcmaster.ca/10.1016/j.psych.2011.08.001>.
14. Studdiford J, Connif K, Traves K, Tully S. Bedbug infestation. *American Family Physician.* 2012; 86(7):653-658.
15. Susser R, Perron S, Fournier M, et al. Mental health effects from urban bedbug infestation (*cimex lectularius* L.): A cross-sectional study. *BMJ Open.* 2012; 2(5).
16. Williams J. Bedbugs in hospitals: More than just a nuisance. *Canadian Medical Association Journal.* 2013; 185(11):524-524.
17. Williams K, Willis M. Bedbugs in the 21st century: The reemergence of an old foe. *Labmedicine.* 2012; 43(5):141-148.
18. Wong M, Vaidyanathan N, Vaidyanathan R. Strategies for housing authorities and other lower-income housing providers to control bedbugs. *Journal of Housing & Community Development.* 2013; 70(3):20-28. <http://search.ebscohost.com.libaccess.lib.mcmaster.ca/login.aspx?direct=true&db=ssa&AN=88842203&site=ehost-live&scope=site>.
19. Woodgreen Community Services. *The Bedbug Resource Manual: A Guide to Preventing, Treating and Coping with Bedbugs.* 2008, Toronto.
20. Zipple A, Batscha C, Flaherty P, Reynolds JL. Don't get bugged: Practical strategies for managing bedbug infestation in psychiatric rehabilitation programs. *Journal of Psychosocial Nursing & Mental Health Services.* 2012; 50(7):22-26.



Indwell is a Christian charity that creates affordable housing communities that support people seeking health, wellness and belonging.

Our Vision:

Hope and Homes for All

Visit us at Indwell.ca

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