

NEHA Bed Bugs – Getting Real

Hello and welcome to the presentation, Bed Bugs in Elderly and Disabled Low-Income Housing - Getting Real.

To ask questions about this presentation, join the presenter for a Chat Hour in the Networking Lounge. I would now like to introduce our presenter, Dawn Gouge, Associate Professor and Specialist for Urban IPM at the University of Arizona.

Hello, this is Dawn Gouge. I'm an Urban Entomologist; and I work at the University of Arizona, College of Agriculture and Life Sciences. And I'm part of a multi-agency collaborative team who submitted a USDA Grant in 2014 to conduct an integrated pest management adoption study in elderly and disabled public housing. And I was happy to take this opportunity to report just some of our initial findings.

Not surprisingly, we had pretty typical pest management related issues when we did our initial assessment of our buildings and German cockroaches being the most prevalent, bed bugs, and pesticide and chemical use patterns that were really quite alarming. This study built on previous work that was conducted in Oregon and Arizona, where we looked specifically at an inner-city location, and elderly and disabled public housing in particular.

And all of our residents in these locations were 62 years of age or older and/or disabled. They are living in locations that are classified as independent living, but many of them definitely needed help with basic needs.

If you look at the table, you'll see that Location 1 in Arizona actually had a per-capita income level quite a lot higher than the other locations we're looking at in the same county. So just bear that in mind. And the reason why this was so important is that sites in high-income areas, relatively speaking, generally have fewer building-related issues. And elderly and disabled sites may well have less severe pest issues compared with general public housing overall, so this could really be as good as it gets.

Site 1, here's what it looked like. We had 156 units. It was built in 1962, so it's 54 years old. And typically, the life of a building is considered to be around 30 years with a good inning; and so we're way beyond that point. And that can sometimes lead to building-related issues. It's a four-story building, and it's built in like a C-shape, with a rather beautiful inner atrium that the residents enjoy a lot.

We started our adventure in Site 1 by doing a visual inspection. At the time that we met the residents, we went literally apartment by apartment; met the residents; and placed two sticky monitoring traps in the kitchen area, two active volcano traps under beds or near the bed if it wasn't possible to get under it, or whatever piece of furniture was actually being used by the residents to sleep in. And then we looked for obvious pesticides and chemical products that were being used in the apartment. And we asked residents to show us things that they used and also took photographs of those products from underneath kitchen cabinets – anything that was obvious.

By far the most prevalent pest was the German cockroach. And in Site 1, about 40% of the units were actually infested. And we were really quite concerned that they might be generating some serious health impacts. Between 23% and 60% of urban asthmatics are sensitive to cockroach allergens, which is a large range; and we're never going to know where our sites fall in that range. But suffice to say, a significant number of people are going to be impacted by the allergens.

And then cockroach allergy is associated with severe asthma, among the elderly in particular. And the elderly have rather poor perception of asthma symptoms because of their relatively sedentary lifestyle, and there is increased morbidity associated with asthma in the elderly.

Also, cockroaches are known to passively transport microbes on their body and in their body. And several of these are common causes of food poisoning and gastroenteritis. And the elderly are particularly vulnerable to food-borne infections and gastroenteritis because of changes in the immune system. And as we age, gastrointestinal physiology, use of immunosuppressant or acid-suppressive medications, and comorbid conditions associated with aging all exacerbate the problems associated with asthma.

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And moving on to bed bugs, which were by far the bugs that most people were concerned about, they're blood-feeding active parasites of humans; and about 14% of the units had active infestations confirmed at the initial assessment. So although they're not competent vectors of disease-causing pathogens in living conditions, they do annoy residents and stress people out enormously.

There were not a large number of people reporting swelling or itchy bumps; and that may be because the average age in the building was up in the 60s, and elderly people tend to have less of an immune response to the bites. But lots of people reported sleep loss, anxiety, worry, depression. And we did not confirm that there was any significant blood loss causing anemia, but we did find several extremely high-level infestations. We were very worried about some of the residents because of that.

Also very worrying was the typical pesticide and chemical use patterns that we found. Nearly 60% of the units had multiple pesticide products. We found mostly over-the-counter products, lots of Internet-purchased products, some illicit and legacy products from many years gone by. And this is a pretty typical find; this was all in one cupboard stashed in the kitchen.

We found a wide variety of different things: cockroach bait stations were very common; aerosol sprays -- very, very common; battery-powered sprayers, the residents really seemed to like those; pump-action sprayers, less commonly found; lots of powders; some chemical-release foggers; gels; and even the use of vapor strips, and I'll show you a picture of that later on.

We found more than 145 individual products, so that's almost one per unit on average; two unidentifiable powders that neither the resident nor staff could really be certain what it was; lots and lots of people using large-volume products; some concentrates; some outdoor-only products; legacy products, already mentioned; only one person actually had a monitoring trap in their apartment. We did have a few people with interceptor traps under their beds, and lots and lots of mattress encasements. We were really encouraged to see that. Although the use of mattress encasements alone is insufficient to control bed bugs, people had the foresight to go and get them and put them on; but many of them were covered in bed bugs.

None of the residents reported ever using gloves or any kind of personal protective equipment when they were using their pesticides, and none of them reported actually ever reading the label or how to use the product.

The products that we found were mostly pyrethrins, phenpyrazole, borates, diatomaceous earth and silica, amidinohydrazone, some organophosphates of various kinds, carbamates, and second-generation anticoagulants in bait stations were also found.

We definitely were able to document some significant off-label use patterns and excessive use patterns; no PPE, as I've already mentioned; and unfortunately, one of the apartments actually had to have a hazardous material cleanup crew come in to clean up; and I'll show you some pictures of that, because of just really excessive use of Demon WP, which had been purchased by a resident off the Internet. This is 40% (inaudible), so it had been placed in areas where you just didn't want to see it.

So this is that location and that's the kitchen floor. And you can see that chalky residue, and you can see that white sheen on the kitchen cabinet there. That is the Demon WP, so clearly off-label and excessive. That's the inside of the kitchen cabinet. This is what really alarmed us and where I went in search of the housing manager to show that this is definitely a significant health hazard for the resident because the product was being applied around and on her dishes that she was using to eat off of.

There was a variety of mystery things that we never really got to the bottom of – we were worried about one situation in particular that it was [carbaryl] dust, but it did not turn out to be.

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We had some large-volume finds and some gray canisters that had labels pulled off and then some others that had homemade labels taped over. So we couldn't fathom what that was about, but that's one of the things we found.

We took some pesticide residue samples from kitchen floor areas using alcohol swabs. We started off taking background samples in common areas that had the same flooring as the kitchens did in the actual apartment. And from those background samples, we found a variety of pyrethroids and (inaudible). We initially we thought we may find some of that in indoor areas if people were walking and moving the product around, and that did not seem to be the case.

The first unit that we took samples from in the kitchen was a really good example of totally appropriate use of Maxforce FC roach bait stations, the active ingredient being fipronil. And it was placed at exactly the number that was appropriate for the space. We found in the residue results: bifenthrin, cypermethrin, deltamethrin, phenothrin, cyfluthrin, cyhalothrin, and prallethrin – so nothing terribly relevant, other than the cyfluthrin, that could possibly had come from background common areas; but we weren't sure – but then other things as well that we did not find in the background area.

We did not find any fipronil either. So although we know baits are moved around by the insects that consume them and die with the bait inside them, we totally failed to find any in the kitchen samples that we took; but we found lots of other things.

The second example, Unit B, was an example of a totally excessive amount of Maxforce roach bait stations – so the same product, just used in excess, and four to five different bait stations placed in one really teeny, tiny kitchen.

Interestingly, again, we found absolutely no fipronil residue from the kitchen floor at all; but we did find dichlorvos, which was not evident in the apartment at the time – or at least not in the kitchen or reported by the residents.

Interestingly, next door we did find a dichlorvos pest strip; but we weren't ever able to determine whether the actual kitchen sample where we found the dichlorvos, whether that product had moved from next door or whether it was being used in that area. We just didn't find it. We can't know. But suffice to say that in the location where we did find the no pest strip hanging, it was a living area -- which is an off-label use for that product.

Unit C had legacy pesticides present and a lot of other things; and there was some correlation with what we expected to see with what we found in the small samples, but not a lot.

And then Unit D had an unidentifiable white powder, and this was the unit that we were worried about might have been carbaryl; but it was not – or we didn't find that in the residue tests. But now you'll see that the powder was placed on the carpet, and we were taking residue samples from the kitchen. But still, we didn't find any evidence in the kitchen – but other things, we did.

Unit E had multiple large-volume pesticide containers, and we found absolutely nothing in the kitchen. And this was a resident who reported that he had been using the product primarily on and around his bed for bed bug control as opposed to doing the kitchen; and we didn't find anything in the kitchen, for example.

Unit F was really excess use of Demon WP, the pictures you've already seen. And we did find cypermethrin in large quantities indicated in the residue tests.

Unit G had multiple pesticide products in every room in this apartment, and there was some overlap between the products we found and the results from the kitchen samples. And similarly, in Unit H, there was some correlation with what we found.

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But overall, we had to conclude that just looking at the products that were evident was not necessarily going to tell us what was being applied in the kitchen areas. Similarly, taking swab samples from the kitchen floor was not going to indicate what that resident was being exposed to in their living space.

So lots of pesticide exposure hazards noted. I know you can't tell from this picture, but the bed on the right was absolutely covered in a white powder that we weren't sure what that was. And then the picture on the left shows the lavender-scented Raid; and this resident really enjoyed the smell, so seemed to be using that product largely for the overwhelming smell that was throughout the apartment as opposed to its intended use.

So why did we have so many German cockroaches? Well, gosh, there was lots of food and lots of harborage for German cockroaches throughout. The bed on the right, those are dog treats – very delightful little puppy that resident had. And that food was always available for that little dog.

And some clutter issues -- and I should say at this point we have not asked the residents to do anything different at this point. We wanted to gather as much data as we could and change the pest management strategies that were being used in the absence of any kind of cooperation from the residents, with the exception of the fact that the residents welcomed us in whenever we showed up – which was frequently and often – and were really, really helpful in that manner.

Conducive conditions – lots of food, lots of harborage – but we also trapped cockroaches in very, very clean and tidy apartments that really put my kitchen to shame.

When we looked at what was happening – by the way, pest management for cockroaches – there was no inspection, there was minimal reporting. The residents pretty much had given up on complaining. There were a few people that still complained; but really most people had sort of given up on that, I think.

The staff really at the time were very caring and considerate of the residents, excellent group of individuals, but did really blame the residents, that it was a housekeeping issue, and were really shocked when we showed them the data from very, very clean kitchens that people, even no matter what you did, they were still going to have German cockroaches around in a building that has a 40% infestation rate.

So we learned that the pest management contract – we discovered that it really wasn't being adhered to anyway. And the cost was really low: \$1 per unit per month. So arguably, they were getting what they were paying for in some respect. There was no bait rotation. There were some baits being used on occasion, but no bait rotation evident. And we definitely wanted to see some sanitation protocols in place.

And I'm specifically talking about staff protocols, not resident protocols at this stage, because we discovered one unit that had just huge numbers of blowflies. And in that door track that you see, those are actually blowflies that were bred in the kitchen bin; there was a chicken carcass in there. And the resident had been taken into hospital and had been gone for a couple of weeks. And nobody had thought to go and empty the rubbish bin; so unfortunately, there was rather a lot in the way of bugs of various kinds in that apartment. And when that resident came back -- they'd been hospital and they were recovering – and had quite a monumental issue to deal with in the way of pests in the apartment.

So those are the kinds of protocols we were trying to get in place.

So what we did suggest was the rotation of fipronil – well, actually, two baits with active ingredients with very different modes of action. And so that is now actually being done, this rotation. And we talked about establishing policies regarding waste disposal, in the event that residences are vacant suddenly for any particular reason and for getting them some in-home help when that happens.

Realizing that our residents being elderly or disabled have a relatively sedentary lifestyle, sometimes very significantly impaired visions – sometimes not, overall seem to have a higher tolerance for bugs of all kinds and even bed bugs in instance and very high heat in some of the units. Even during the summer

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when we visited, air conditioning units were turned off or up really high; and so we couldn't help but think that this was very conducive for rapid breeding of bed bugs in those units.

And very low light – it was very, very typical to go in and no matter what time of the day it is, the drapes or the shutters were closed and very low light levels. And we're not really sure how that affects the bed bugs, but we did see them out and about during the day quite often– very odd. So more conducive conditions for bed bugs – we have sedentary people, and bed bugs love people who sit still or lie still for extended periods of time, so lots of opportunities for them in houses like (inaudible).

So we looked into what was happening for the bed bugs. And there were no inspections going on; minimal reporting by residents -- lots of resident concerns regarding am I going to be evicted, am I going to lose all of my belongings, what is this going to cost me, so lots of concerns of that nature. And then the staff were very caring and really, really wanted to get on top of the bed bug problem and cockroach problems for the residents, but really were rather uninformed. And many didn't know what was necessary and so could not provide oversight for the pest management company involved.

We also noted incorrect application information reported on service tickets. So what was actually happening and what was being reported were two very different things on occasion; that is no longer going on. And really, the bed bug protocol was relatively poor even so; and quite often on service tickets, we'd note "insufficient prep." And 9 times out of 10, the technician would show up, pop their head in through the doorway, say "There is insufficient prep standard in this unit, so I can't treat." And the problem is that is then dealt with or considered to be dealt with. So there was no oversight or follow-up or analysis of what was actually happening at the time initially; now there is.

Recommendations that we made to get on top of the bed bug problem was recognizing first and foremost that full preparation is just impossible for some residents. An effective service protocol was lacking and needed to be corrected. And an effective two-week unit turnover protocol was also lacking and terribly essential because if you have a vacant apartment, and they're only vacant for two weeks and there's a history of bed bug infestation, what can you achieve in two weeks? You have to take a really aggressive approach. And what was happening was just really nothing.

So we worked with the Housing Authority and pest management company, and we established residents should not be relied upon to report bed bugs. Don't rely on it. We have to be proactively inspecting if we are going to know what's going on in buildings in recognition that the residents just don't know they're there sometimes, generally have no clue, or they don't know that they are bed bugs – they know there's something there, they just don't know what it is. And there's a strong incentive for them not to report anything because they're worried about being evicted, losing their property, or maybe fined in some cases.

So we submit annual inspections at an absolute minimum annually, but far more effectively would be twice a year going into every single unit and inspecting for bed bugs. And we demonstrated how you could do that very, very rapidly; it wasn't going to take a ridiculous amount of time, and it was a very good investment of the time it takes.

So the reality is residents should not be relied upon to prep, should not be asked to do expensive prep because they're physically incapable or, in some cases, mentally incapable. And qualified help is imperative. We can't rely on residents' family or friends to come and prep for bed bugs without running the risk that they would take bed bugs with them as well.

And 20% of elderly public housing residents are classified as persons with disabilities, and this is compared to only 13% of elderly persons in the U.S. in general. So even just looking at the elderly population in these buildings, a great number of them are going to be classified as disabled as well. And many require assistance with basic tasks, as mentioned before.

Also, the Housing Authority's 504 Reasonable Accommodation Housing Policy and Procedures Act actually requires an exemption or an adjustment to a rule, policy, or practice or service that may be

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necessary for a person with a disability to have an equal opportunity to use and enjoy a housing unit, access to facilities, activities, or programs.

So that's verbatim taken out of 504. So really, it's incumbent upon us to make sure that those accommodations are made for residents that need them.

This is one example of a relatively simple prep sheet. And I know you can't read that, but I'm going to just highlight a couple of things. Please move any furniture and like items away from baseboards to allow access for inspection. Clearly, some of the residents are just not going to be able to do that. Propping beds against the wall, removal of electrical faceplates and such – it's just simply not going to happen.

That doesn't, of course, mean that we can't manage the pests; but we just have to do it in a way that's going to accommodate reality. Not only are we going to need a gigantic bag of money to make this happen, but sound contract specifications and an informed staff so that they can oversee practices constantly -- so making sure that the good contract specs are actually being followed and everybody is on the same page and knows what's happening in a building with regard to bed bug management and German cockroach management.

And having staff available to prep and manage disposal, as well as preparation, whenever necessary and movement of items. We did have one unfortunate case where a lady had asked for help removing a highly infested mattress; she wanted it out. She had conveyed her wish; there was nobody that could help her out with the mattress, and she ended up dragging it down the corridor past numerous other apartments to get it out into the dumpster. And lo and behold, before the dumpster was emptied, that mattress had disappeared. So no doubt it was back in the building or back in somebody's bedroom.

Having qualified in-home help involved in laundering, bagging, vacuuming – those people who know how to work around bed bugs are an essential component of getting on top of bed bug problems.

The alternative to this reality is that we need to get comfortable with our elderly and disabled living with bed bugs and cockroaches for that matter. And I, for one, am not comfortable with that option.

So we encouraged the Housing Authority, the residents, and the pest management company to not play the blame game. The low-bid approach quite often results in you get exactly what you pay for; if you're paying next to nothing per unit per month, that's what you can expect to get in return. We suggested that they do not mandate throwing out of belongings or moving residents to new apartments and that each individual situation would be handled case by case because there are situations when if some heavily-infested item can be thrown out or replaced easily, then that's great; but it should be done very carefully.

And also moving of residents – on rare occasions, it really is necessary to move them, if they're ill in particular. But if not, then it's best to leave the residents where they are and get on top of the bed bug issue rather than risk moving them and bed bugs to a new apartment.

We said don't forget surrounding units. And when we're treating one unit, we've really got to be extremely vigilant. Our policy is to treat the surrounding units. But if some authorities are going to implement a policy not to do that, they need to be really, really monitoring those units weekly for some time to be certain that bed bugs don't move into those locations.

And not to move residents into previously-infected units for elimination is as certain as you can be, and that means getting on a very aggressive two-week protocol together, which is going to involve heat treatments because I don't believe that there is – this is just my personal opinion – that there are many interruptions that can get the job done in (inaudible) fumigation in two weeks.

So we encouraged everybody to implement a bed bug policy or plan; conduct regular inspections of units and common areas as well; have an effective service contract, and we helped them with the details of that; and work with experienced pest managers or pest management teams that are going to really get involved in some significant training to get up-to-speed on bed bugs.

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And we did have one case where a company that had not worked with bed bugs before really went beyond the call of duty to get up-to-speed on bed bugs and (inaudible).

And then we are at the point in this study where we are conducting resident education efforts, and we have been providing training for housing staff. There were several instances where the staff themselves had taken bed bugs home after working in bed bug infested units, and that is definitely something to be avoided and can be avoided. And so that training was necessary.

So the bed bug control elements for us -- there's a long list there and really quite often Housing Authorities need help with the contract writing to make sure that all of these elements are built in. And you can eliminate one or two of these, but you're going to end up with a process that is longer and usually something that's not eventually as cost-effective.

We encourage move-in protocols and inspections and monitoring protocols, encouraging awareness and reporting and ensuring that the residents are encouraged to do that rather than discouraged, so then there are no evictions or loss of personal items.

Cleaning, reducing clutter or organizing, of course, are all great things when we can get that kind of help to the residents. Vacuuming and removal of all bed bugs and cockroaches – but bed bugs mostly – each and every time the pest management team visited was a very difficult thing to get in the contract, but got there eventually when we demonstrated what a dramatic difference that made to the remediation process.

Encasements, sealing, and repairing cracks and crevices; use of heat, cold, and steam when appropriate; pesticides, crack and crevice treatments to avoid dusting and contact pesticides when necessary; an infested item disposal plan – how do they do it so the bed bugs aren't moved around the building; and having a very aggressive unit turnover protocol to accommodate that two-week window.

In the past eight months, I want to say there's been just significant communication challenges: multiple housing staff changes; housing staff going way beyond the call of duty in order to help improve the living conditions for the residents; multiple pest management companies involved; pest management company staff going beyond the call of duty; multiple human resources and employment job description challenges because we were asking people to do things that weren't written in their contract initially. We've had agency staff going beyond the call of duty on many occasions as well – wonderful resident cooperation and only one resident complaint to date, which it must be a record.

Numerous strategizing sessions with public housing management teams; significant challenges to pest management practices; but eventually, getting there – eventually; education for housing staff – lots of that – as much as possible each and every time we go; lots of face time – face time with residents and face time with staff. I can't say that we know each resident by name at this point, but we at least know all the jobs.

So what happened to the bugs? You might have seen that I referenced eight months of work, but I really want to stress that what you're seeing – the reductions here on this slide – has really been achieved in the last four months. There's been a huge reduction in bed bug and German cockroach levels in the units overall. There are now no severely infested bed bug units at all. Only low-level bed bug units still persisting, which means when we go in and do visual inspections, we find less than 20 live bugs.

Overall, 57% reduction in the number of units with bed bugs and a 31% reduction in the number of units with German cockroaches. And we are due to return and do our next assessment, and expect those numbers to be drastically improved again.

The most significant challenge I want to say was the change to the pest management practices – even though it was clearly necessary, that took a really long time to achieve.

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I just want to leave you with some final thoughts about public housing. They have more than 3,000 public housing agencies managing more than 1 million public housing units in the U.S., 27% of which are occupied by elderly and non-elderly disabled. By 2020, one in six Americans will be 65 or older; and I think the number right now is one in eight. So there's going to be an increased demand upon these facilities and public housing for the elderly.

Pest infestation, bed bugs in particular, really adds to the physical and social stress associated with living in these apartments. And bed bugs are now and historically have been ingrained in our very culture, influencing society and our quality of life. No doubt they are here to stay, and we have a choice as a society whether to adapt in how we want to care for our elderly and non-elderly disabled. We have to make this decision now. And it's nothing short of a reflection of how we and our loved ones can expect to be treated in the future ourselves.

Thank you for listening to this session, and I will be available to answer questions during the open question session.

Thank you to our presenter.

And thank you, everyone, for attending the presentation: Bed bugs in Elderly and Disabled Low-Income Housing – Getting Real. On behalf of the National Environmental Health Association, thank you for joining us today.