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Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

Welcome to the presentation: Don't Panic! Helping Social Services Providers Cope with Bedbugs. To ask questions about this presentation, join the presenter for Chat Hour in the Networking Lounge.

I would now like to introduce you to Amelia Shindelar, Community Health Coordinator from the Department of Entomology at the University of Minnesota.

All right, great, thank you.

And thank you for joining us today to talk about bedbugs. I wanted to give you a little bit of background about myself before I get started, and then I will go ahead and jump into the presentation today.

As Marissa said, my name is Amelia Shindelar; and I am the Community Health Coordinator at the Department of Entomology at the University of Minnesota. Obviously, entomology is the study of insects; but that's not my background. My background is in public health and community organizing. So what I do here is I take all of the resources being done on bedbug prevention and control and try and turn it into materials that are more useful for the general public and for people who are actually dealing with a bedbug infestation. So my role is kind of that of a translator, to translate the science into educational materials.

In today's presentation, we're going to start out doing some basic information on bedbugs. I don't know what everyone's background is, so I like to always start with some basics. We are going to talk about why bedbugs are a problem; a little bit about the problems they cause in our society; and then I'm going to cover bedbug control, with some specifics for those of you that do home visiting and some guidelines that can help you prevent bedbugs in your homes and in your offices, and also resources that you can share with your clients or with others who are dealing with bedbug prevention and control issues.

About bedbugs – we get a lot of questions about why are bedbugs such a problem in the United States now. And lots of people have different theories about where they came from and what happened. So we're going to talk just a little bit here about the history of bedbugs.

Bedbugs are a human parasite. They bite us, and they live on our blood similar to mosquitoes. And they're a traditional parasite – something that has been around for a long time, an insect that has been biting humans for all of recorded history pretty much. You see mentions of bedbugs in ancient Greek and Roman texts. I think there have even been situations where they've found bedbugs in with Egyptian mummies, so it's really not a new problem.

Bedbugs thrive when people live close together; so we really saw a lot of bedbugs; and bedbugs really spread and were really prevalent by the late 18th century, when the Industrial Revolution brought out of the countryside and into cities. Like I said, bedbugs really thrive on that type of environment -- people leaving close together.

They came to the United States, we think, with the first immigrants from Europe. There is some hypothesizing that they were even on the Mayflower and came with the Pilgrims. So they've really been here for quite a long time and were just kind of a normal fact of life. And if you talk to the elderly populations in particular, a lot of them will tell you, oh, yeah, I remember bedbugs from when I was little, and we did X, Y and Z to get rid of them. So they were really a fact of life by the 1900s and through World War II.

And then we, as a society, changed; and we developed some pretty strong chemical insecticides that we were able to use to control for bedbugs. And they pretty much went away. And this had a lot to do with the ways that we were using insecticides. So at that time, the insecticides were what are called a broad-spectrum insecticide. And this would really kill a lot of what it came into contact with. And a little bit later, we'll talk about current insecticides; but you can kind of see in the pictures here, these are two pictures from Army archives.

## NEHA

### Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

On the lower left-hand side, you'll see a young man here who is spraying insecticide; and you can see on the wall where there's a delineation or there is a lighter part on the top, and then lower down in the picture it gets a little bit darker. And what you're seeing here is this young man has taken his insecticides and pretty much sprayed everything in that room with the insecticide. And this did a really great job at eliminating the issues that they were having with bedbugs and other human parasites at that time.

You can also see here a picture in the upper right-hand corner of a soldier whose body is being sprayed directly with what we think was probably DDT to control fleas and other insects. And so this did a great job at controlling the bedbug infestation; and they just kind of went away, and we kind of had a hiatus from bedbugs for the rest of the 20th century.

But since the early 2000s, bedbugs have become a re-emerging issue in the United States. This map is from some analytics programs that we've got on our website. And we like to show it just because it shows you how widespread the bedbug column is in the United States right now. You can see, we get people from all over the country visiting and looking for information on bedbugs. And this kind of goes back again to that point I was making earlier about how bedbugs like it when people live close together. So the highest numbers of bedbug infestations are also in the places where there are the most people because bedbugs really thrive when people are living close together.

So why are we seeing bedbugs re-emerging in the United States? There are a couple of reasons. One of the biggest reasons is a lack of public education. Because bedbugs were not around for such a long period of time, there wasn't any research being done on bedbug prevention and control; and people weren't talking about it. And so there just wasn't that kind of societal knowledge about how to deal with a bedbug infestation. So when they did re-emerge, people didn't know what they were dealing with. And it took us a long time to start talking about and start dealing with bedbugs again.

Another big reason is the increased mobility of human populations. We move around a lot more now. It's much easier for us to travel and to go places now than it was. And this has really created a situation in which because we're moving around and bedbugs are hitchhikers and they live with us and in our stuff, we're moving those bedbugs around with us. And so as we move from apartment to apartment or home to home or go on vacation and stay in multiple hotels, in each of those stops there is, A, the potential we could pick up bedbugs and then, B, the potential that we're taking those bedbugs with us and dropping them in all those new places again.

And then finally is the change in insecticides. We don't use these broad-spectrum anymore. The insecticides that we use for bedbug control and for control of other insects are much more specialized now than they used to be. They act on a particular insect or on a particular method, and so that means that you can't go out and spray for all the insects.

So the way you would control cockroaches is not going to be the way you would control bedbugs, and it's not going to be applicable to ants or some other insect pests that might be in your home. And this means that in the past when you went out and controlled for cockroaches, if there were bedbugs, it would kill the bedbugs as well. Well now, if you're controlling for cockroaches, you also have to control for bedbugs as well. There are new multiple applications of different types of insecticides.

There are also some issues with insecticide resistance in the bedbug population. This has to do with, again, that lack of knowledge and not knowing how to control bedbugs properly and effectively. We ran into some issues, and we're continuing run into issues, with the bedbug populations that we're finding in people's homes that are resistant to a lot of the insecticides that we have available to control these insect populations.

So the combination of these different factors has really lead to kind of a perfect storm as far as bedbugs go. And it's been great for the bugs and not so great for us. And so we just have seen bedbugs really spreading since the early 2000s. And while we have seen some success in developing new control measures, it's still a really growing and prevalent issue in the United States.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

I want to talk a little bit now about identification. You can see from these two pictures that identifying the bedbug might be challenging. These are both pictures of bedbugs, but they obviously look quite different. So we're going to talk a little bit about how to identify a bedbug and why that might be important.

Bedbugs are confused with many things. One of the services that we offer here at the University of Minnesota is people that think they might have bedbugs can send us in a sample of what they think is a bedbug, and the entomologist here will look at it and identify it. And we keep very rudimentary statistics on what we receive as far as samples go, and I would say about 70% to 80% of the things that are mailed to us that people think are bedbugs are not bedbugs.

Bedbugs now are in the news, and people are talking about them more. And so people get worried. And really, we run into situations where if it was on a bed and it looked like it might be an insect, then someone is going to think it's a bedbug. So I have here in front of you now just a list of a couple of things that we have received that are not bedbugs.

One of the things we get a lot is lint. I think they put "fluff" on here; but essentially, some people will swear that piece of lint has legs and it was moving and they know it was an insect. So you really run into a lot of issues with misidentification.

One of my favorites is I'm pretty sure someone sent in – was eating in bed one day, and they got a bunch of crumbs in their sheets; and they thought that they were insects. And they picked them all up and very carefully put them on little pieces of tape and labeled them all and sent them in to us. And even without putting them underneath a microscope, it was pretty easy to look at it and identify it as pieces of cookie and not bedbugs.

Again, why is identification so important? Controlling bedbug infestation is difficult and expensive, and we'll get into this a little bit more. But you don't want to treat for bedbugs if it's a different pest because, like I said, the insecticides are going to be different and the methods and the ways that you control for those bedbugs are going to be different.

Bedbug treatments can be really expensive, not only for the person paying for the treatment – so if you're in a situation where it's like a landlord/tenant relationship, most of the time the landlord is going to be the one responsible for paying for that treatment. But it's also really expensive for the tenant. There's a lot of preparation work and a lot of things that need to be done to get ready for a bedbug treatment. And you really want to make sure that this is the insect you're treating for not only because you don't want to be spending the money on the treatment if it's not necessary, you don't want to be exposing people to insecticides that they don't need to be exposed to. And you just want to get to the root of the cause of the problem. If they're dealing with some other type of insect, you want to be treating that problem and not treating for bedbugs; so identification is really vital when you're beginning to go down the road of a potential bedbug infestation.

So how do you identify a bedbug? Like I mentioned earlier, bedbugs are a blood feeding insect. They're human parasites and are most often found in close relationship to humans. They are reddish brown in color. They're about one-quarter to three-eighths of an inch in length. And this is all – we're talking about adult bedbugs here. I'll talk in a minute about juvenile bedbugs and what they look like.

But you can see here from the picture that when you compare a bedbug to an apple seed, they're relatively similar in size and shape. And this is a great tool for helping people identify bedbugs. Most people have seen an apple seed and can kind of know what that looks like, and so that can be really helpful when people are looking to know if they are dealing with a bedbug infestation.

Like I said, we here at the University of Minnesota will identify bedbugs for you. And a lot of hazmat and professionals will identify insects for free, and most states have an extension service where you can send in items to be identified.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

So like I said, adult bedbugs look like that apple seed shape, are reddish brown, and are kind of large and easy to identify. We rarely run into issues a lot of times with juvenile bedbugs. So on the top here, we have a picture of the different life stages of a bedbug. On the left-hand side is what's called a first instar bedbug. Instar is the scientific name for juvenile bedbugs. And as the bedbug grows, it goes through multiple instars or multiple life stages. And you can see that bedbug is growing and changing shape and size and color. The first instars are really small, and they're almost translucent in color before they've had that first blood meal; so they can be really hard to identify.

On the lower left-hand side, you see a picture where there are multiple bedbugs at different stages of feeding. And this is a first instar bedbug that has been feeding on a person's arm. And you can see at the beginning, it's really a tan color; and as it's ingesting that blood, it really changes color as their abdomen becomes full of blood. The bedbug after it feeds will then shed its skin, kind of like a snake; and this allows it to grow into new, larger life stages.

The picture at the bottom middle is of bedbug eggs. Bedbug eggs are quite small, frequently compared almost to a grain of sand. And they can be very hard to see and identify. So they might be a good sign of knowing there's an infestation there; but unless you really know what you're looking for and know where to look, they can be really hard to find and to see.

And then the final picture on this slide, on the bottom right-hand side, is an adult bedbug who has recently fed. So not only do they change shape and size as they grow and go through their multiple life stages, they also change shape depending on where they are in the feeding cycle. Bedbugs feed every 7 to 10 days. When they're hungry, they're going to look like the bedbugs along the top of the slide there; but when they've just fed, they're going to be this kind of longer, elongated, scar-like shade on the bottom right. Also, they're generally a much darker color.

All of these things make it pretty hard to identify bedbugs. Another thing that we really like to emphasize is we like to talk about bedbug bites. There is a lot of misinformation available about bedbug bites. We really like to reinforce that you cannot diagnosis a bedbug infestation by the bites alone. Bites do not occur to pattern; there's no distinctive bedbug bite mark. A bedbug bite is going to change depending on a particular person's immune system, so some people react to bedbugs and some people don't react at all.

Bites do generally occur on exposed skin – so the skin that's exposed while you're sleeping. We most often see bedbug bites on legs and arms and sometimes on the trunk or the face. But you'll frequently hear people telling you that, oh, I know that it was a bedbug because there were three bites in a line; or I know it's a bedbug because it looks like X, Y and Z. And that's really an urban myth, and you're really not going to see any type of pattern when you're trying to diagnosis a bedbug infestation.

Also, this information is so pervasive and so common that people we've talked with – medical doctors – who have told us that they can diagnose a bedbug infestation by looking at the bites on a person. That's just not true. Other insect bites, rashes, or skin conditions are often confused for bedbug bites. You really need to find other signs of the infestation to know for sure if it's a bedbug infestation or not.

As I was saying, different people react differently to bedbug bites. This is going to be affected by your immune system, if you've been bitten previously or not, the size of the infestation – if it's a very large infestation and you're being bitten repeatedly, you're more likely to show a reaction.

The use of some cold medications which are antihistamines will suppress bedbug bites. It's also important to know that about 25% of the population does not react to bedbug bites at all. So you run into situations where, say, you have a husband and a wife and sleeping in the same bed. And one person is reacting to the bites, and the other is not just because of their immune systems and the way they react to insect bites. And this can cause a lot of issues because then they might not be getting the infestation addressed, or it might take them a long time to realize that's what they're dealing with.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

I didn't put it on the slide here but one thing we also want to note is that as the population ages, the percentage of people who do not react to bedbug bites increases. So in the senior community, you're probably only looking at about 50% of the population not reacting to bedbug bites. And this is really important to note and to understand because these are communities who are already disadvantaged in some ways, and then they're dealing with other medical issues. And it can take a really long time for anyone to realize that a bedbug infestation is occurring if there is no reaction to the bites. And so if you work with an elderly community or in senior housing, it's something that you really want to keep an eye on.

So if you can't identify bedbugs from the bites, how are you going to know if there is a bedbug infestation? The best thing to do is to look for signs of a bedbug infestation, which we're going to talk about right now.

Bedbugs are what is called a "nest parasite." This means that bedbugs do not live on a person. If you talk to someone or for some reason come into contact with an individual who is telling you that they have bedbugs living in their hair or living on their bodies, you're going to want to look at other things. It could be another insect pest; it could be something completely different. But it's pretty sure it's not going to be bedbugs.

Bedbugs like to hide close to a resting or sleeping person. That's why they get their name of bedbugs because they're traditionally most often associated with a bed. But these days, we rest and sleep in a lot of places that are not beds, so things like couches and easy chairs and even just your office chair could become a site for a bedbug infestation.

Bedbugs like to feed when that person who typically sleeps in the bed or sits on the chair is present and preoccupied. They don't like a lot of sound and movement, and so they are going to wait on the bed or other surface until that person comes back. And they're going to feed and then go back into hiding.

Bedbugs have a very shallow bite, and so it's very unlikely that anyone would feel them biting. They like to feed undetected, and then return to hiding where they ultimately need to develop, mate and lay eggs. You can see on this picture here on the corner of this mattress that this mattress has a bedbug infestation. And what you're seeing here on this mattress is not the bedbugs themselves but what is called bedbug fecal matter – so essentially bedbug poop. And bedbug poop is a great sign that you can look for and know that bedbugs are present.

Some additional common bedbug hiding places – all cracks and crevices within eight feet of a resting place. Like I said, in this day and age, it's not just the bed. It's also the easy chair; it's also the wheelchair if a person is disabled. It could also be a sofa. And when you think about a modern home or a modern apartment, pretty soon almost the entire home or apartment is going to be within eight feet of a resting surface. So the infestation can be pretty widespread. Again, the most common things are going to be mattresses, box springs and bedframes.

This is a picture of the bottom side of a box spring. You can see here, they had turned the box spring over and were looking for a bedbug infestation because they suspected there might be something present. And what we have here is we have multiple stages of bedbugs. Here you can see a young bedbug, an instar; and here you can see an adult bedbug. You also see all these black dots, which are the bedbug fecal matter.

And then here these look like first instar bedbugs, so the bedbugs have just hatched. But what it is most likely – here are some more -- are cast skin. Like I mentioned, bedbugs when they grow, they shed their skin like a snake; and they leave that skin behind. And that becomes a really telltale sign of a bedbug infestation. And it's nice that it's the skin, so it's not going to scurry away. So you can pick that up and you can send it in and have someone identify it for you. So it's a good tool for identifying a bedbug infestation.

Some other things – this is an electrical outlet. And we took off the switch plate; and inside of the switch plate – I guess it's not called switch; it's an electrical plate with a bedbug infestation. Again, you can see here the black spotting, the telltale fecal matter, and also the cast skin of this bedbug infestation.

NEHA  
Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

This is a wall in an apartment that had been vacated, so we're not 100% sure what was going on here. But we think that what happened was where the wall was situated in the apartment and kind of guessing how the apartment might have been set up, we think there was a couch against this wall. And then above that couch, there was a clock hanging on the wall. So you can kind of see here how there's a circular shape. And so what we think happened was that there was a bedbug infestation in the couch, and then they spread out from that couch and were looking for somewhere else to hide. And they hid behind that wall clock and left this circular shape on the wall. This again is the fecal matter of the bedbug infestation and not the bedbugs themselves.

This is a window frame in a poorly maintained apartment complex. And again, we were in this. This was a vacated apartment. But while we were in that apartment, we were looking in these cracks and crevices here along the window frame; and some bedbugs actually came scurrying out of that.

This is a picture of curtains, and this is actually pretty uncommon. Bedbugs do tend to stay a little bit lower down. They tend not to climb the walls. They want to stay close to where they're going to find someone to bite or to feed on. So this was actually a really severe infestation, and it's pretty uncommon. But I did want to show you the picture because if you just came into the apartment and looked around, you might think, oh, this woman has got some issues with mold or with cleanliness; but you would never think bedbugs kind of seeing this here, what you see in the curtains here. In this particular apartment, this woman did not react to a bedbug infestation; and the infestation got really severe before it was diagnosed – so just a couple of things to look for when you're looking for a bedbug infestation.

And again, like I said, furniture that's near a resting or sleeping surface – so a dresser, a bookshelf, a night table, something like that. This is the inside of a dresser that was in a bedroom, and you can see here the area that's got this bedbug fecal matter.

So one of the things I'd like to mention – well, how can you tell it's bedbug poop as opposed to some other insect or cockroaches and things like that? And one of the things is that bedbugs when they poop, it's a liquid. And that liquid dries and kind of absorbs into the surface and dries. And so if it's dust that you can wipe off or wash off pretty easily, it's not bedbugs. It might be cockroaches; it might just be dust. You might be dealing with something else; but bedbug fecal matter, like I said, it's a liquid that's deposited on the surface and then it dries and it's got kind of raised bump. But it's definitely not a dust or something that can be easily wiped off – so something to look for when you're trying to figure out if someone is dealing with a bedbug infestation.

So why are bedbugs a problem? There are three reasons that we talk about when we talk about why bedbugs are a problem. I'll say this a couple of times, but one thing to keep in mind is that there is no evidence that bedbugs vector human disease. There has been a lot of research and a lot of money put into figuring out if bedbugs vector diseases, and they don't. I'm not an expert in this area, but it has to do with the way the bedbug gut is set up and how they digest blood.

So what is the problem? Well, it's really expensive to get rid of them. They do cause some other health issues. And then there is always the risk, if you do home visiting, of bringing bedbugs into your own home.

We'll start with cost of treatment. I think I've mentioned a couple of times that bedbug treatments are really expensive. It's really hard to control a bedbug infestation without professional help. Bedbugs are expert hidiers. They spend about 90% of their life in hiding, as we saw from the pictures earlier. They can hide in any really small cracks or crevices.

Essentially the thickness of your credit card – if there's a crack that is that thick, that's a great place for a bedbug to hide. They love that. So you need to have someone with a lot of experience in looking for and controlling bedbugs. And a lot of times the insecticides that are available for bedbug control are controlled substances, so you cannot apply them in a home without being licensed to do so.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

There is also a cost borne by the residents of the home. Depending on what type of treatment is being done, there might be a lot of preparation work that needs to go into preparing for that bedbug control treatment. And that can be really expensive; and, again, I'll talk about that in a minute.

Health issues – as I mentioned, bedbugs do not vector any infectious diseases. The health issues that we see with bedbugs are more around mental health. There is a lot of evidence coming out showing that people who are dealing with bedbug infestation show signs of things like Post-Traumatic Stress Disorder and depression. We saw one case study where a woman committed suicide after having dealt with a long-term bedbug infestation and really not being able to control that. So there are some really pretty substantial mental health issues.

We also see a syndrome that's called Ekbom's syndrome or delusional parasitosis. And this is not directly related to bedbug infestations, but people who have delusional parasitosis often think that they have a bedbug infestation when in reality they don't have. There's no pest present. The infestation is a delusion.

And there has been some research into what causes delusional parasitosis and how to deal with it. That's not where we're going to go today in our presentation; but it is something to keep in mind. If you ever are dealing with a person who, despite all the evidence to the contrary, insists that they have a bedbug infestation and might talk to you about things like bugs that they can't see or insects living in their skin or things coming out of their nose or some of these really kind of more -- what to us might seem obviously not true, you can know pretty quickly that, A, they're not dealing with a bedbug infestation and, B, you might be dealing with a situation of delusional parasitosis. And in that case, that person is going to need some clinical help from a mental health practitioner.

We do see issues with secondary infection. If someone has a severe bedbug infestation and is being bitten a lot and they're scratching those bites, we do occasionally see issues where those bites will then become infected with a bacterium.

One of the reasons that our program exists and one of the things that we see a lot of are the negative health effects of bedbug treatments. Misapplication of pesticides is a really big problem. And like I mentioned earlier, controlling bedbugs is hard and using the chemicals correctly and effectively can be really challenging. And so there are many examples in the literature and in popular media of people who have injured or, in some cases, even killed themselves when they're trying to deal with a bedbug infestation.

Recently, a couple of months ago, there was a story that went around in places like the *New York Times* and CNN and whatnot of a man who had a rental car; and the rental car had a bedbug infestation in it. And instead of returning the rental car or dealing with it in some other manner, he decided to try and treat the rental car with a rubbing alcohol. Using rubbing alcohol to treat bedbugs is completely ineffective; but it is very commonly recommended, especially if you go online and you do a Google search and you ask Google, how do I treat bedbugs, rubbing alcohol is going to come up pretty high on the list of things you should do.

So this individual soaked the inside of their rental car with rubbing alcohol; and after all that hard work, decided they needed a break and lit up a cigarette and quickly engulfed the rental car in flames. Luckily, he escaped undamaged; but the rental car was obviously a complete loss, and I think a number of other cars parked in the vicinity were also.

We also see situations where – currently we're dealing with a situation here in Minnesota where a number of people have applied Orthene, which is an insecticide used for killing fire ants. They have applied this insecticide inside their homes to try and control bedbug infestations, and this is a relatively toxic insecticide. So there is a lot of worry around getting that cleaned up and helping those families that are dealing with the bedbug infestation and educating them around not using those insecticides.

And I could go on and on about situations where you see property damage and people getting sick or dying from trying to control bedbug infestations and not going about it in the right way. So that's where I

## NEHA

### Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

come in, in doing education and trying to help people understand how to properly control a bedbug infestation.

And then lastly, though not least, there is always the fear of bringing bedbugs into your own home or office. If you're working out in the community, if you're visiting people in their homes, if you're doing inspections and you are in homes on a daily basis, you could definitely be running into bedbugs; and you want to be able to protect yourself and your family and your colleagues from that infestation.

Just briefly about bedbug control – here in Minnesota, where I am located, you see two major types of bedbug control treatments. One is a heat treatment, where the space to be treated is heated up with essentially it's like a large furnace. They're called heat exchangers. In the picture on the left here, you see these big silver machines. And what those are is essentially an extremely powerful space heater. And so they bring this really powerful space heater into the home to be treated. They hook it up to a diesel generator -- because generally the electrical network in the home is not going to have enough power to run these machines -- and put in some fans to circulate the air temperature.

They bring the air temperature up to about 145 degrees Fahrenheit, and they hold it there for a number of hours. They've also placed temperature sensors around the room in different places so they can make sure that the room and the items that are being treated are getting up to the requisite temperature. Bedbugs will die at 122 degrees Fahrenheit. But like I said, they heat the room up to 145 degrees because you need to not just get the air temperature up to 122 degrees; you need to get the temperature of all the objects in the room up to that temperature as well. This is actually a really effective and really safe way to treat for bedbugs.

There are some issues with – obviously, you wouldn't want to leave your pets in a home that's being treated this way because it can make them ill. If you own really expensive artwork or something that might be damaged at 145 degrees, you have to remove that item and treat it otherwise. But most things in our homes can withstand these temperatures.

The other option that we see most commonly used is the professional insecticides treatment. You see here on the bottom right a man spraying a bed with insecticides for bedbug control. And insecticides treatments get a bad rap when they're used for controlling bedbugs, but they can be really effective. And there are a couple of things to keep in mind with insecticides.

Only products that show an EPA registration number should be used. So we've seen a lot of issues with illegal or custom-formulated or just hoax products on the market for bedbug control. And you definitely want to make sure that if a home is being treated for bedbugs, you want to make sure it's a registered product.

You need to be really, really thorough in your application of insecticides for a bedbug infestation. And this is where you see treatment failures a lot. Somebody has come in and sprays really quickly and they're like, oh, I controlled the bedbugs, no problem. Well, if you don't apply the insecticide in all those cracks and crevices where the bedbugs could be hiding, then you're really running a really high risk of not treating the infestation. And you're just going to have to come back and do it again, or the treatment is going to be a complete failure.

So we recommend to use what are called three formulations, so three different ways that insecticides are mixed when you're controlling for a bedbug infestation.

The first is what's called a residual insecticide. This is the type of insecticide where if you spray it or put it down as a powder or something other than a spray, and that insecticide continues to remain active in the environment. So you would want to put this underneath couches or underneath places – somewhere where you're unlikely to come into contact with it. And this would stay in the environment and kill the bedbugs as they came into contact with it.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

The second one is a short-acting or a contact insecticide. This is the type of insecticide where if you see a bug and you spray it with this insecticide, that bug will die. But as soon as that insecticide dries, it becomes inactive; and so it's good for things that people are going to touch or are going to come into contact with because the chemicals become inactive and are not harmful to people.

And then the final one is a dust insecticide. This is generally a white powder. It might be what is called diatomaceous earth, which is actually a natural substance. It's ground up really small and it's abrasive and it simply dries up the bedbugs. Sometimes it's other types of insecticides that are formulated as a powder, but this is really useful in places like those electrical sockets that I showed you earlier, where obviously you're not going to want to be spraying a liquid insecticide into the outlet. So you can put this dust insecticide in there. The dust insecticides are generally really long-lasting. They'll stay in those places indefinitely and continue to be active.

You do want to be careful in how you apply any of these insecticides, and you want to make sure you're consulting with someone who has experience in insecticide application.

I'll mention this a couple more times, but do not use over-the-counter insecticides. Over-the-counter insecticides are not effective in controlling bedbugs. There are many insecticides that are on the market and are labeled as being effective for controlling bedbugs, and they're not going to solve the problem for you. You also don't want to be using over the counter insecticides that are formulated for something else. These ant and roach insecticides that I have on the screen here were presented to us by some individuals that we were working with, and they said this is what they were using for controlling bedbugs; and it obviously wasn't working.

Over the counter insecticides may kill one or two bedbugs; but because bedbugs spend so much of their lifetime in hiding, they're not going to come into contact with those insecticides while they're active in the environment. They're just not going to control the problem; and, again, this is where we run into issues way more, is with people overapplying insecticides and making themselves sick through the toxicity of the insecticide as opposed to the actual health effects of being bitten by a bedbug.

We went through heat treatments a little bit earlier; but, again, there are the whole room heat treatments, where you heat up the entire room or the home that is infected. And then there are what are called heat chambers. And so on the lower right-hand side here, you see essentially it's like a fancy tent. It's really well insulated; and you would take all of the furniture and whatnot in the room and put it into that tent and then close that up and heat it up. And that would kill the bedbugs that are on those items inside of the chamber, inside of the tent.

And this can be really great in situations where maybe like, say, you have a dorm-type situation and there's a lot of movement in and out of the dorm; and you want to treat everybody's stuff before they move into the dormitory or when they move out. It can also be nice because using this heat chamber could really reduce the number and the amount of insecticides that would be needed to treat a home for bedbugs. So if you treated all the furniture – all the sofas and beds and whatnot – in the heat treatment chamber, you could then spray the baseboards and the carpets and the walls with insecticides and kind of hit the bedbugs both ways, both with heat and insecticides.

They also have heat treatment chambers that are stationary, so like shipping containers transformed into heat treatment chambers. There are different ways to do this; it's not just this tent structure.

A couple of other things to keep in mind – when you're using insecticides to control for a bedbug infestation, it's going to take multiple visits. You are not going to kill all the bedbugs on the first visit. And so it's going to take two to three visits by a pest management professional to control a bedbug infestation with insecticides. And because of this, a lot of people don't realize when they're going into it that one treatment by a pest management professional is not going to control the infestation. And so when they continue to see bedbugs after that first or second treatment, they're going to automatically assume that the treatment has failed. And that's just, again, because of the type of insecticides that are available and because of the way we can apply them, it just takes a little bit longer to control for that infestation.

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

Proper preparation is essential. When you're doing a treatment with a pest management professional, that person should provide you with a list of instructions on how to prepare for that treatment; and following those instructions is really important. A lot of the things that we have in our homes can't be sprayed with insecticides if that's the type of treatment that's being done, and so they have to be treated in other ways -- like you can't put insecticides on people's clothing. So what you would have to do is you would have to treat all that clothing in another manner. And generally what's done is it all has to be laundered. A lot of times, you have to move furniture away from the walls. You have to take things apart. You have to be able to get in all the cracks and crevices where the bedbugs are hiding. So it's really important, but it also can be very disruptive and really expensive.

Again, please, please don't use over the counter insecticides to try and control bedbugs. There are a lot of evidence showing that it's not effective and that more often than not using over-the-counter insecticides can cause damage and illness.

Another thing to keep in mind is that bedbugs love clutter. We just like to show these two pictures. Bedbugs could be present in either of these homes, but they're going to be much harder to treat and much harder to get rid of in that messy, what looks like a college boy's dorm on the bottom right--

I think we got disconnected there for a second, so I'm going to start again at the beginning of this slide. I hope that's not a problem.

Another thing to keep in mind when you're dealing with a bedbug infestation is that the bedbugs really like clutter. And the more cluttered a home or an apartment is, the harder it can be to treat for bedbugs. Both of these homes are just as likely to have a bedbug infestation, but it's going to be much more challenging to get rid of bedbugs in the home on the lower right-hand side where you see all this stuff.

Every one of those things is a hiding place for bedbugs. You're going to have to clean that up and get rid of all of the junk and wash all the clothes and discard all the papers. And it's just going to be so much more difficult to deal with than the home on the upper left, where it's pretty simple and tidy. And, yeah, there's some stuff that needs to be dealt with. There are some books and decorative things and whatnot. But it's just going to make your life a lot easier.

You're also much more likely to notice a bedbug infestation in a home that's relatively simple and clean as compared to the home that's got all that clutter. If you've got all that clutter going on, it's going to take you a lot longer to take you to realize that something might be amiss. So controlling clutter can be a real issue when dealing with a bedbug infestation.

I want to talk a little bit about do-it-yourself pest control. We're just going to cover this really briefly, and then we're going to go into the information on some tips for home visitors.

I'll say it again, don't use over-the counter-insecticides. They're not effective. There are mechanical methods that are much more effective at controlling bedbugs. If for some reason you're in a situation where a pest manager is not available, whether it be because of cost or other extenuating circumstances, doing these other things is going to be much more effective than trying to buy some Raid or other over-the-counter insecticides and applying those.

If you live in a home that you do not own, we really, really highly encourage you to report the infestation. Most of the time, it is the landlord or property owner's responsibility to provide pest control. And this is going to be slightly different depending on each state and municipality has different regulations around pest control, but better to report the infestation than to try to deal with it on your own.

Laundering, this is the easiest thing to do. As I mentioned earlier, it's common when you're dealing with an insecticide treatment to have to put all your clothes through the laundry. It's also a really effective way to prevent bedbug infestation if you can launder items that might be affected before they come into the

## NEHA

### Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

rest of the home. Or you can use laundering to kill bedbugs on anything that can go in a dryer – so not just clothes, but pillows and linens and soft toys and whatnot.

It's important to remember though that there is no residual effect. So as soon as the clothes come out of the hot dryer, they can become reinfected. So if the home itself or the space itself still has an infestation, you're going to want to put the stuff into like a plastic bag or a plastic bin for storage until the infestation has been controlled.

Vacuuming – a vacuum cleaner will not actually kill bedbugs, but it's a great way to kind of capture and collect bedbugs. And this, again, it's a common tool in professional pest control. You really want to focus on the cracks and crevices, those places that we talked about earlier where bedbugs might be hiding. If your vacuum cleaner has a crevice tool – so that long, pointy tool – that's really great. It helps you get into those cracks and crevices. It also helps increase the suction power, which can help suck up the bedbugs.

Because vacuum cleaners don't kill bedbugs, it's really important to remove the bedbugs from the vacuum cleaner after you've suctioned them up. So this would be like if you have a canister vacuum cleaner, you would dump out the canister into a plastic bag, tie the plastic bag shut and discard it. Wipe it out and clean the filter. If you have a bag vacuum cleaner, you would want to remove the bag – again, put it inside of a plastic bag and discard it. Like I've said, you'll want to concentrate on those areas where bedbugs are hiding and then dispose of the bag or the contents of the vacuum cleaner once you're done.

Freezing – you can kill bedbugs by freezing them; it's complicated though. It requires precise temperatures and a long period of time. Again, being from Minnesota and it being cold a good part of the year and whatnot, we frequently get asked about freezing. So at the simplest level, you have to have a freezer that is zero degrees Fahrenheit or below; and it has to maintain that temperature for approximately four days. Otherwise, the bedbug eggs could survive and you could start the infestation.

Things that can be frozen – anything that won't be damaged in a freezer. So what you want to think about is liquids. Anything that has a liquid in it could potentially be damaged. So if you think about most of your modern electronics, they have an LCD screen; and if you froze your computer, the screen would crack. So you're not going to want to do that. But if for some reason you have a fabric item that go in the laundry – if it's dry clean only or very delicate for some reason -- you could put it in a freezer. Books, toys, pictures – things like that can go in the freezer.

We get this question all the time: It's winter; it's really cold. Can I just put my stuff outside and kill the bedbugs that way? Or can I open all the windows and turn the heat off and kill the bedbugs in my house? And, no, you can't. Even here in Minnesota, where it's frequently way below zero for long stretches of time, there are other factors you need to take into consideration.

Thermal radiation – when the sun hits an object, the air temperature might be cold but the object itself is going to be warmer. Also, it's almost never zero degrees Fahrenheit for four days straight. It does happen occasionally, but it's really uncommon; and it's just not a safe or effective way to control bedbugs. And you don't want to try to freeze bedbugs out of a house because you're probably going to end up doing some pretty substantial property damage. And if you're in a cold climate, you could freeze the pipes and whatnot. So trying to kill bedbugs with the ambient air temperature through freezing is not at all effective.

Steaming – again, this is something that you might see a pest management professional doing. It's really effective. Again, you need to get the bedbugs up to about 122 degrees Fahrenheit; and that would kill them. If you want to try and use a steamer, you would want to use a commercial steamer – not a carpet cleaner, not the Shark that you use for steaming your clothes. You would want to look for something that gets to a hotter temperature, is a little bit more powerful.

If you're going to do this, again, you see it more often in like pest management type situations just because it requires some expensive equipment. You're going to want to use what's called a non-contact or an infrared thermometer. As you can see in the picture, this is a thermometer that you point at something; and it will take the temperature without actually touching the object. And you can use this to

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measure the amount of heat that's being put onto the surface. And you know that if it's between 150 degrees and 180 degrees Fahrenheit, that will kill the bedbugs and most likely will not damage the surface.

Again, there's a lot of risk in working with hot steam. You can burn yourself; you can damage materials that you're trying to control a bedbug infestation on. So really use a lot of caution if this is the method that you want to use.

And then last but not least is killing bedbugs by hand. Most people are going to kind of cringe when you say it, but bedbugs are just an insect. You can capture them and squash them. Double-sided sticky tape for squishing things is really great. That credit card or a used card – like I said, anywhere that your credit card can fit could potentially be a bedbug hiding place. So using that card or a thin plastic card, you can kind of fish bedbugs out of those hiding places – get them to come out into the open where you can then wipe them up with hot water and a cloth or capture them on some tape.

And then there are these things called mattress encasements. And what they do is it's kind of like a giant pillow case for a mattress essentially with a zipper on it. And you put your entire mattress or box springs inside of the encasement and zipper it shut. And then if there are any bedbugs on that mattress or box springs, they're trapped inside of the encasement and they can't get out and will eventually die in there. Or it simplifies the environment and makes it much easier for you to see on the mattress or box spring if there are bedbugs there. And then you can easily wipe them off or vacuum them up.

It's really important though that you get an encasement that's specifically designed for bedbugs. There are encasements that are designed for things like dust mites or allergens or protecting the mattress from spills, and those are not going to trap bedbugs. So you definitely want to have one that's specifically for dealing with bedbugs.

I know that I ran through all of those things really quickly, but we really do have a lot of really detailed information on how to do each of those kind of do-it-yourself treatments on our website; and I'll point you to that if you're interested.

Again, I just wanted to reiterate, don't use over-the-counter insecticides. I know I'm starting to sound like a broken record; but, again, we see people getting really sick and, in some cases, even dying from over and misapplication of over-the-counter insecticides. So, please, avoid them and encourage the people you work with to avoid using over-the-counter insecticides.

Do not use homemade or custom-formulated products. If it's not labeled, if it doesn't have that EPA registration number on it, you don't want to use it because you don't know what it is.

Do not apply pesticides directly to your body. This might seem like common sense; but when you are working with people who might have other mental health issues or are just so desperate to get rid of that bedbug infestation, they might be applying those insecticides directly to themselves. And it's pretty obvious you don't want to be doing that.

Do not use rubbing alcohol, kerosene or gasoline. Again, these are things that we commonly see and hear people recommending. We even see other health practitioners recommending rubbing alcohol as a common use for getting rid of bedbugs. But they're not that useful. They may occasionally kill some bedbugs, but the flammability issue is much scarier and much worse than any benefit that they could possibly bring. So please avoid using these flammable materials to try and control a bedbug infestation.

And again, putting things outside is not going to kill bedbugs. The heat is unlikely to be hot enough consistently, and it's unlikely to be cold enough. Temperature controls are a great way to kill bedbugs, but you have to be able to actually control that temperature. And placing the items outdoors in the hot sun or the cold winter is probably not going to kill your infestation.

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And then do not discard all the furniture. We frequently talk to people who will call us up and say, "I threw away my couch and my bed and everything, and I still have a bedbug infestation." And discarding your furniture is just not – they're still in the cracks and crevices, and you could still be dealing with bedbugs there. So getting rid of furniture is not a good way to deal with a bedbug infestation.

Some guidelines for those of you that do home visiting: Be aware of the potential, but don't be super paranoid. There is the potential that you could bring bedbugs home with you or to the office, but there are a couple of simple things you can do that we'll talk about.

Education is the most important. Knowing what to look for and knowing how to be careful and when to be cautious is definitely the most important thing.

The use of a bedbug containment kit I'll get into in a second.

Again, keeping your car and home free of clutter – this will help you know early on if you have a bedbug infestation and help you control it quickly.

And then like I mentioned earlier, putting your clothes into the dryer for 30 minutes will kill a bedbug infestation. So if you're ever in a situation where you think you might have gotten bedbugs on your clothes, just putting them in the dryer for 30 minutes will help deal with that.

Be prepared; you only want to bring things that are necessary into the home for the visit. Bedbugs – again, they're a nest parasite. They don't live on us; they live in our stuff. And so if you're bringing a lot of things into a home for a visit and then setting them down, then you're more likely to take the bedbugs home with you.

You can keep what we call a bedbug kit in your car. Essentially, it's just a plastic bin, some plastic bags and educational materials, maybe some wet wipes or a change of socks. And depending on your situation, these things will be used in different ways. The plastic box and the plastic bags could be used to contain items that might have become infested with bedbugs. So say you are someone that does early childhood education and you take toys into a home for educational purposes, and you're worried that those toys might have come into contact with a bedbug infestation. You could put the toys into the plastic bag until you had a chance to put them into a dryer or to wash them to deal with the infestation.

A change of shoes or socks in case you're walking around in a home that might have an infestation. You can then change out of your shoes or socks and go on to your next appointment and not have to worry about the infestation.

Clear tape is useful if you think you might need to help someone collect a specimen for identification. That's where you'd also need a flashlight.

And the wet wipes are to clean off your shoes or to quickly clean off items that you think might have come into contact with bedbugs.

During the visit, the most important thing is if you're bringing stuff into a home, don't put it down on a bed or a couch. You want to keep your things away from a potential infestation. So try to keep things separate from where the infestation might be, which it is most likely to be in the couch or in the bed. If possible, instead of sitting on the couch, can you do your visit in the kitchen and sit around the kitchen table where you're less likely to encounter bedbugs?

If you're working with children, can you sit on the floor and get down there and play with them as opposed to sitting on a couch or something like that? So it's kind of thinking about how you're interacting with your clients and how you're interacting with the environment to try and avoid coming into contact with bedbugs.

And then after the visit, you're going to want to once you've left the home, do a quick self-inspection. Look at your shoes and your pant legs, the things that you took in with you – just to kind of see do you see any

## Don't Panic\_Helping Social Service Providers Cope with Bed Bugs

obvious signs of a bedbug infestation. If you are worried about the potential of an infestation, place those items that were in the home with you into some of those plastic bags or plastic boxes that you had in your car in your bedbug kit. And at the end of the day, put your clothing into the dryer to kill any potential bedbugs. If you can't put your clothes into a dryer right away, then again, when you get home or back to the office, if you need to change, put them into a plastic bag that you can either tie or seal shut until they can go in the dryer.

This isn't really common, but we do like to mention it. We really recommend avoiding redistributing items from one client to another. So if you're in a situation where, again, the most ready example that I can think of is in early childhood education where a family might be using toys from a center or from a service for a while; and then that service might take those toys back and distribute them to another family. If you can avoid that or at least insert a time period when those things could be treated – whether it be like putting them in the dryer or one of the other more professional methods that we talked about.

Remember bedbugs are hitchhikers, so moving physical items around is the most common way to move bedbugs around.

I'm just going to run through these resources really quick, and then we're going to be done for today. One of our flagship services here at the University of Minnesota is we have what's called a bedbug information line where if you or other people you know -- your clients -- have questions, they can call us at the number or e-mail us at the number on your screen to get information about bedbugs. And we answer all kinds of questions from across the country -- anything from how do I know if I have bedbugs, to does this product work, to how do I know if a treatment has been successful?

We also have been doing this long enough that we have connections with other resources. And so if you're in a particular state and we don't know the answer to your legal questions or to your questions about the resources in that particular state, we can direct you to the right person.

The other thing we have is this website: [www.bedbugs@umn.edu](http://www.bedbugs@umn.edu). And on that website, you can find a lot of detailed information on all of the things I covered really briefly today. There is that task sheet; essentially, they're fact sheets. They're broken down into instructions specific to, say, laundry or expert instructions specifically to vacuuming. So it really provides a lot of details on things I covered just really briefly today.

Some of them are available in other languages. We've done some translation into Arabic, Hmong, Somali and Spanish. And we're going to be doing some additional translations in the next month or so. There are a lot of really great educational materials there. They are all free to use. They're available in PDFs, so you can download them and print them real easily.

We've also done some multimedia content. We work with a number of immigrant communities who don't read English or their written language very well, and so we did some translations. We have both short videos that are three to five minutes long in a couple of languages that you can find online. And then also we have a longer instructional video that's about 25 to 30 minutes long that kind of covers a lot of the do-it-yourself stuff that I talked about and demonstrates the do-it-yourself activities that I talked about just a minute ago. And that's available in English, Karen, Hmong, Somali and Spanish.

And then we have this ID card. If you would like me to send you out some of these, feel free to let me know. I can also send out a PDF that can be printed. But essentially, it's just a business card that you can carry around. It shows bedbugs; it shows their actual size and some of their hiding places and gives a little bit of basic information.

And then we're on social media. Nobody wants to be friends with us because who wants to be friends with the bedbug people? But it is a great way to access some of our materials, know what's upcoming. And all of our videos and whatnot are hosted on YouTube. So if you want to be able to access those easily while you're working with clients and need to provide education, that's a nice tool.

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If you have questions or need more information about bedbugs or how to prevent bedbugs, both for yourself and for your clients, this is our information on how to get ahold of us. And we're always happy to talk to you and answer your questions.

Thanks for joining us today.

Thank you, Amelia.

And thank you, everyone, for attending today's presentation: Don't Panic! Helping Social Service Providers Cope with Bedbugs. On behalf of the National Environmental Health Association, thank you for joining us today.