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Environmental Health Specialists_Fishing for Fleas

Hello and welcome to the presentation, Environmental Health Specialists: Fishing for Fleas. To ask questions about this presentation, join the presenters for a Chat Hour in the Networking Lounge. I would now like to introduce our presenters, Beth Penrod and Aaron Martinez, Environmental Health Specialists with the Pueblo City-County Health Department.

Hi, my name is Aaron Martinez. I'm an Environmental Health Specialist. I've been here at the Pueblo City-County Health Department for probably going on five years and work in the Vector Program for the past three years. It's been getting very busy, and so Beth was brought onboard to help out. This is Beth Penrod.

Hello, I've only been in this program then for the past year; but last year was a very busy year for us and quite the experience.

We do have the Program Manager, Vicki Carlton, who is the Vector Program Manager.

And just to give a brief update of where Pueblo is. Pueblo is located in Southern Colorado. It's 100 miles south of Denver. And again, like Beth said, we had a very high number of different diagnoses going on. We did have plague, widespread tularemia and, again, rabies. We're always going with rabies cases in animals – so very busy for us.

This actual presentation is about a case that we dealt with, a human plague. Unfortunately, it did result in a fatality; and we will go ahead and go through that case and the investigation.

Plague is endemic to Colorado. These are just some statistics from the Colorado Department of Public and Health and Environment. This recaps 10 years' worth, from 2005 to 2015, of all of the human plague cases in Colorado. As you can see, 2014 and 2015 had quite a few. Hopefully, that's not going to be indicative of what's going to be happening in 2016.

Just for a quick update, the United States averages around seven cases per year, according to the CDC. That's for the recent decade. And then the World Health Organization reports between 1,000 and 2,000 cases per year of human plague, but the cases are probably much higher. And we'll explain on that as we go through this.

Here are the counties that had that human plague for those past 10 years. There are 8 counties here, and there are 64 located in all of Colorado; so there are only 8 out of 64. Adams County, which is near Denver, with four; and then Denver had three. And then La Plata County, which is in the Four Corners Region of Colorado, was our high at eight. And then there at the bottom with Pueblo now is our one case that we had last year that we're going to be dealing with today.

This next slide is the surveillance in Colorado. You can look up and down in the middle there. This map shows all the plague-positive specimens. And so they broke it up into domestic animals, insects, rodents and then wildlife. In the Front Range, again up and down the Front Range, you can see plague cases. And then on that bottom-left corner, that's La Plata County which had the eight cases. And then that's Pueblo County there, so we did have positive cases there. Our next slide will show you where it ended up in the county boundaries.

Here is the County of Pueblo. And although Aaron had mentioned that there were four plague animals, per se, that tested positive, there are only three dots here. And that's because the one at the top, the 81007 zip code, actually had two animals that tested positive there. And so the Colorado Department of Wildlife that collected a dead prairie dog in that area and after testing, tested positive.

We actually were aware of that through Dr. Colton. She is the Medical Entomologist and Zoonotic Epidemiologist at the State. And she mentioned that to us; otherwise, I'm not sure if we would have ever known that prairie dog was collected that tested positive. In fact, there was a rabbit that was also collected from that area that we had no idea about until super late in the fall actually.

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The bottom two cases, the green circle, that is where the case that we'll be discussing today with the human case; and then the blue circle on the left, that is a positive flea pool that we went out and flagged after the investigation for the death that occurred.

This is just a quick rundown on the different types of plague: Bubonic plague, usually dealing with a flea bite, then develop buboes in that area where that flea bite may have been. Septicemic plague, it's more systemic in the body and causes some issues with the organ failure, neurotic tissue. And the pneumonic plague caused by droplets of infected--

From the bacteria.

Bacteria, sorry.

And so even though there are three types of plague, there are a couple of symptoms that are [welts]. They're usually around all three types. And so usually a person would experience fever and chills and extreme exhaustion with any of those types of plagues.

What happened was our case – he was a rancher, and he typically did those duties. So he might have mended fences. But specifically, he had talked about baling lots of hay; and so he had done that prior to him having any symptoms.

On Tuesday, he started feeling some mild shortness of breath; a little bit of weakness; some shoulder pain that he thought maybe he had torn something or just overworked his shoulder while he was baling that hay. And he was just generally feeling unwell. And so on Tuesday, he started experiencing that.

On Wednesday, he still experienced that. By Thursday, he was feeling pretty bad by then. And so he had spoken to his family about bringing him to the hospital. And so it was late Thursday night that they brought him to the ER. And while he was there, of course they did some bloodwork and stuff on him right away – hooked him up to IVs. But just in the four hours that he was there at the hospital from arriving at the ER, his condition had declined. And so they decided to admit him to the hospital super early Friday morning.

During that time, Friday, he was hospitalized. Saturday he was hospitalized. His condition just continued to deteriorate. He was going into organ failure. And they were able to grow some bacteria on those plates from his bloodwork, and it was just gram-negative bacteria. They really weren't quite sure.

And unfortunately, early Sunday morning, he did pass away. And the diagnosis at that time was just septicemia. They knew he had lots of bacteria growing in his body. They really couldn't say much else about it.

However, it was about Saturday night that the hospital lab personnel were not really quite sure if it was either protocol or if it was an accident or if it was just by mere intuition that one of the lab personnel decided to leave one of those culture plates out on the lab bench. And so come Sunday morning, when they came back into work, they noticed that there was a bunch of growth on that plate. And so they gram stained it, looked at it and, sure enough, they thought it looked like plague. And so it could have been just by pure accident or intuition – something like that -- that they left it out on the counter.

So the diagnosis of his passing away was just a general septicemia. And so on this next slide, we're going to talk about the timeline for investigation with Environmental Health and our CD team here at Pueblo City-County Health Department.

So on Sunday morning when they'd noticed that suspicious growth, like Beth said, they did gram stain it. They did call Kathy, who is our Lab Supervisor. She went into the hospital lab to take a look and pick up the culture. And so she took a look at it; she said it was suspicious; she was thinking it was plague. She brought the culture back to the lab here at the Health Department. We do have a BASICALLY-3 lab here, and so she was able to run PCR on that culture at that time.

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It tested positive, but there was an inconsistent template control. And so they knew they had to repeat that come early Monday morning. And so early Monday morning, they did repeat it; and it definitely tested for positive for plague. And so from there, we definitely had to send that up to the Colorado Department of Public Health and Environment for them to confirm as well that it was truly plague.

So on Monday, we tried to contact the family.

Yeah, at this time, the family had no idea the cause of death. They actually were under the suspicion that it was caused from a tooth abscess that they had found in diagnosed earlier treatment; so they had no idea about this possible plague diagnosis.

On Monday, unfortunately, we were unable to get ahold of the family at all. And because we were unable to get ahold of them to discuss if there were many family members around this person with the plague, and where he lived and what activities he did to possibly acquire plague, we did send out a couple of people to that address to see if we could meet up with the family and talk to them about that.

At the time, again, phone calls were placed; but nobody was able to get ahold of any family member. So myself and another person with the CD team took a drive out to that location. I'm kind of glad that we did. We weren't able to make contact with the family. We did get a lay of the land and kind of see it was definitely a rural environment ranch set up, but a few obstacles we had to overcome.

That past couple of days, it had been raining pretty heavy. There was a river that we had to cross, and there was no bridge. So without the proper four wheel drive, you're not going to be getting through that. So that's why we were unable to make up to the house at the time of the investigation; so we were able to do some planning around that.

We did come back to the Health Department; and at that time, somebody was able to get ahold of the family and explain that we did get a positive for plague on the culture. And again, it was a shock to them. They thought that it was from a tooth abscess.

And so they were very shocked. It took them a little while, I think, to digest that information before they would call us back to ask us more questions. And it was during one of those conversations that we found out that there were six family members that could have possibly have been exposed to him. Even though we were sure it was plague, we weren't really quite sure what type of plague.

And there were some different notes in the hospital reports that he may have had a cough; he may not have. In speaking with the family, they said, well, yeah, he had a cough; but he typically does. So just to be on the safe side, our Medical Officer did write prescriptions for them all to get prophylaxed.

And then we, of course, asked about pets in the home, and there were two dogs. The case had one dog that went everywhere with him typically, and then the family also had another dog. And neither of those animals had any type of flea or tick protection, and so we highly recommended that they go and get those for their animals.

So on Wednesday morning, it was Beth, myself and Vickie. We did drive out to the property, where the river was down at that time. We were able to get across and meet with the family. Again, this was kind of some explaining -- what we were doing out there, what our suspicions were. And they agreed to show us around the property. They wanted to find out if they did have some prairie dogs that they were around.

On this next slide here, you can see where the home is – in the middle. And on the right is the flea pool prairie dog town that we did go and flag.

So they did take us around the property. We wanted to kind of get an idea of what they had out there and see how much time he spent out in that area which, it turns out, he did spend quite a bit of time out there. He had recently been out there shooting some prairie dogs, getting rid of them, because it was right up

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onto their ranch land where they do a lot of hay baling. So the patient and the dog were out in that area quite a bit.

Anyway, this is where we did start our investigation when we went out to the location to flag for fleas. So that was Wednesday morning we talked to them. They showed us the site.

Around lunchtime, we came back to the Health Department to load up and get our equipment to go out and do flagging. By the time we got to the Health Department, we had a surprise impromptu press conference that was lined up in one of our conference rooms that we had no idea about. So our Program Manager stayed to take care of the press conference. And it turns out, the majority of the press conference, all they wanted to know was who had passed away; where the location of the ranch is; what kind of risks for any of the other neighbors or people of Pueblo County. So it was quite interesting trying to deal with that when we hadn't even done the investigation at that point.

Also, with that press conference, our Public Information Officer was out of town that day. And so just trying to make sure that everyone is trained on how to do that and what is necessary at that time can be a little difficult. So that's something that we're also looking at to make sure that there are numerous people trained for instances like that if it happens ever again.

So after lunch, we did load up our equipment and headed out to the location for flagging. We did get some photos while we were out, which is kind of nice to look back on now.

This is the team the first day that we went out. Four of us went out to the ranch to do the flagging.

And in that top picture, Aaron and I are on the right; you can't really see much.

We only had two supervisors who had ever flagging before, and so they were trying to give us a rundown of what to do. Everyone else was very inexperienced with that. And so at the time, we were under the impression that we needed to have tiebacks on. And so what we did was when we got out to the field, we sprayed down with DEET. So anywhere from 30% or 40% of course is what is going to help repel the ticks or fleas the best. And so we sprayed down with DEET entirely, and we put on those tieback suits and then sprayed down with DEET once again and then put on some latex gloves. So that was our CBE that we used to flag.

And even though those pictures look very beautiful—

It was a hot day.

It was super hot.

95 to 100 degrees – this is 2:30 p.m. in the afternoon – very beautiful, very calm, just a nice, beautiful place to be. Kind of eerie though just knowing that we're standing there, we're looking at this prairie dog colony. No activity going on. The only thing that we could see were these burrowing owls flying in and out of some of the burrows. In terms of wildlife, there was nothing happening in that area, and so it kind of had a weird feeling to it.

So that first day, there were just four of us. And then when we do flag, we work in partners. So there were two teams of two that first day. The next day, we had decided to go to the property of their neighbors.

That property is adjacent to where we were. You can look on this map. In the blue, that's the second day of flagging, where we flagged. Standing in either pasture, you can look across and see the prairie dog colony; so it wasn't very far away.

Day 2 we had a larger team because the prairie dog colony was quite a bit larger, and it was very widespread; and so we brought more people out.

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There were seven of us. Of course, we worked in teams of two again.

We did it a lot earlier in the morning too, so it wasn't as hot.

There were three teams, and then our supervisor took a bunch of pictures and kind of oversaw what we were doing. Here is us getting ready for the day.

In this second field, it was interesting – very high activity in terms of the prairie dogs, quite a bit of other wildlife – coyotes running around and just a different feeling in that field.

And so we'll talk about our flagging procedures, so how we do it here. The first picture, you work in partners. One partner is the snaker, and the other one would be the bagger. And so the snaker has a flexible, long, metal cable, similar to like a plumbing snake. The long cable has a clamp on the end. And at the end of the clamp, we had put a flag; in this case, we used white felt. And the felt seemed to work really well because it kind of simulated fir.

Yeah, the fleas burrowed right into it. It was nice because when you would pull it out, they were kind of trapped in the fiber. They weren't jumping; they weren't trying to move; they were just burrowing into that flag. So after pulling it out of the hole, that's where that risk – trying to get it into that bag and trying to keep that other person safe from getting any fleas on them.

So you would put that stake down into that hole and try to kind of wedge it in there as far as it would go. Sometimes it would go three feet or so, but our snake was about six or seven feet long or so. Sometimes you could get it all the way down in there. But you would let it sit there for about 20 seconds, as far as it would go; and then we would slowly pull it out.

And then that is where you would have your partner, the bagger, they would be ready with a gallon-size Ziploc bag and then kind of bend down as the snaker pulled that out. They would try to put the end of that into the gallon-size bag, and the bagger would kind of half seal the bag. And then from the outside of the bag, squeeze that clamp to unclip the flag from it, and the snaker would pull it out. The bagger would completely seal the bag and then put it into a secondary bag.

And the secondary bag was something that we have changed in our protocol. At the beginning, we were only doing one bag.

We can talk about that more once we get to what we did when we changed things around.

This is another view of just the beautiful landscape and being out in Colorado. We're making somebody jealous out there.

Here there are some things that you kind of see in the back. You do see two coolers; one cooler we used to put all of our equipment in. And so we put our flags in there, our bags, possible markers. If you're going to multiple locations, you'd want to write down on the bag which location that flag was pulled from. And of course you always want extra gloves and some more DEET.

And some water – definitely water.

And then the other cooler we had icepacks in. That might be something that we might look into changing and doing some dry ice, but to keep them cold. So after you'd bag your fleas, you'd put that into the ice chest.

Some of the things that we had discussed in the hot wash that we had with the CD team here after this investigation were the risks that were involved. So you definitely have to have willing staff to go out there. You're dealing with a possible plague. And so having energetic young staff definitely helped; but that, again, increases the risk; the more staff members out there, the higher the risk.

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The flagging and bagging portion of this investigation, there was definitely a risk there because you're in the middle of what could be possible plague. And then also in the lab when we're packaging, we found out that after freezing the fleas, if the freeze time is not long enough, there could be issues there because we were pulling these specimens off the flags; and if they're still alive, then you can have some issues there.

And so the picture at the bottom just shows from a distance kind of what we looked like out in that field bagging. So here are a bunch of people in their little white suits out there. And I'm sure for the public driving by that seemed exciting a little bit.

Yeah, definitely the neighbors started asking a lot of questions. We did have a couple of people that had stopped and were watching us from afar. I actually saw some guys taking photos from afar as well. So we probably alarmed a lot of people when we were out there dressed like that.

Aaron mentioned before with the flagging that especially if you go into a colony that is no longer there and there are fleas there, they are going to be hungry waiting for their next blood meal. And so they're going to be ready to jump on anything they can. So there is definitely some risk with that, as well as with bagging, because when you're bagging that flag, you do not want to have a bunch of air in there because then the bag is large and could (inaudible) the seal. And so you want to kind of put as little air in there as possible.

But a lot of people when they bag something and they're trying to get the air out, they like to kind of squish it against their chest or something like that. And, of course, you don't want to do that with bagging and then of course the packaging.

This is what didn't work for us – was the tieback. Again, 100 degree day – just so not, no shade and DEETing up before put the tieback on. It is miserable, very restrictive. And then, again, we look like we're out there doing radioactivity work or something to the neighbors. They didn't know what was going on, so that didn't work very well.

The freeze time didn't work for us the first time as well. Twenty-four hours was not long enough to kill these fleas. It slowed them down. We ended up sending them up to the lab. We put a note in the package that there were some live fleas in there; but the second time that we sent them up, we did a weekend freeze; and that was enough to kill them, so it made a huge difference. So make sure that you're killing the fleas before you put them in the package; it makes them a lot easier to work with.

Aaron didn't mention that that is flea from the red hot chili peppers. He is freezing right now. But if he didn't freeze them properly, he could be jumping like that.

And then what didn't work was on the bottom is prophylaxis versus workman's comp. We did have one employee that had a bug bite. We didn't know what that came from. We were kind of in the midst of it – the first time out; the situational awareness was not there, and did not want to take any chances with that. And so in order to get that taken care of, she had to go to workman's comp. That brought up whole new issues around sending people out to the field when you're flagging for fleas.

So now we're working with our Medical Officer, as well as the CD team, to figure out if there's going to be a protocol in place for having a possible prophylaxis at a time if need be.

Especially in this scenario because there was already a confirmed human plague death, and this was his property. We were going out there; it was very likely that he contracted it off his property. And so at times, I think it could create some problems with sending your people out to flag an area that you know that there is plague and that it's very likely that you could contract that just the same if you don't take proper precaution. And so that is something we're trying to look at changing with our policy; hopefully, we can get that in place for 2016.

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So because of that, again, we did have a hot wash with this. And we did not have flagging protocols in place, and so that's what our next step was. We went ahead and drafted up some protocols for what we do in the field on the left-hand side; and it has the materials, the procedure. And then on the right-hand side, what we do in the lab before we're going to package and send the specimens up to be tested.

And so I'm sure everybody's lab protocols will be different. Once we bring our bags back, we put our flag on some white paper; I'm sure butcher paper would probably work the best. But we just used scrap white paper to put the flags out, so then we could check and pick off those fleas and put them in containers. Of course, pour out any dirt or anything like that that might be left in the bag and search those areas for fleas as well to put into our shipping.

And again, you're in PPE in the lab when you're doing this.

Just in case – just in case that they weren't frozen properly. And for us here, if we were to ship those fleas, it is a Biological Substance Category B; and so there are three different forms of containers that we have to put those fleas in prior to shipping them.

What we came up with next is what our uniform looks like now when we go out into the field – much easier to get around -- just the gloves, boots, a lot of DEET and a lot of situational awareness. And so it definitely makes it much easier, working in high heat.

Again, we're not drawing attention to ourselves when we're in the field. People are not stopping and staring, trying to figure out what was going on.

This is a picture of our coolers here.

This is the equipment that we will be using now. There are a couple little changes, I think, since we've taken this picture. The picture with the coolers, there's two of them. Like I had said before, one is for supplies: your extra flags, your bags, those types of things. And then the larger cooler would have your ice packs or dry ice. And so we found that we're hoping to maybe put some dry ice in there this next time that we flag to see if that will speed up the process of freezing. So maybe we won't have to put them in our freezer for three days or something like that to freeze.

And then the other picture has some boots. We're just going to be using boots.

And there's a picture of latex gloves there, but we actually are going to be using gloves that hit about mid forearm or so – so they're up a little higher. Of course, you need that DEET – 30% to 40% DEET. Next a flag or snake, and then not just one gallon bag, but two gallon bags per flag since you are double-bagging that. And then did not take a picture of the markers as well, but you always want to carry them.

So after confirming plague, what we did was get together our public education and the information that we did in a mass mailing. The mass mailing – what we did was a five-mile radius of this ranch. We were able to get addresses from our county GIS and send out a letter explaining what we had found, and then also asking assistance if other people had any prairie dog colonies on their property that they were worried about or suspecting a die-off that they give us a call so that we're aware of that and possibly go out and see.

As well as a little information of staying away from dead animals and keeping your animals away from other dead animals and, of course, treating your pets then for fleas and ticks.

And so the public notice that's on the right there. The prairie dog that the Department of Wildlife had picked up, that was on private land. There really weren't many houses near there at all. And so the closest area that we had that would be occupied first day would be an RV Park. And so we brought some of those plague warnings and notices by the RV Park and posted those around there – especially for travelers that are coming in and out of that area that may not know that, one, Colorado can have plague, that it's endemic; or that it's even in that specific area.

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So we dropped of those off and posted them around the RV Park, and then sent a lot of those mass mailings out to the residents within that five-mile radius.

And so this all just kind of boils down to with plague, it's always here. We just need to be aware that people take precautions. And we just -- at that point, your pets are safe, people are safe. And hopefully, we do not have another human case.

And so with that as well, of course we're always about trying to prevent something like that from happening and not just reacting to it after it does. And so this year, we're definitely going to put out a lot more information on plague, as well as tularemia, rabies and all the zoonotic diseases. But we're going to do press releases and information through the newspaper, website and social media to kind of inundate people with that information so hopefully this doesn't happen.

So basically, at this point, this is a slide of partners that we feel are important in plague surveillance. And again, our USDA partners that take care of a lot of the wildlife -- letting them know what we found, where we found it. That way, they're aware; they can let us know if they're dealing with anything.

Colorado Division of Wildlife -- again, talking with them, using them as a resource of what are they sending, what are they testing. There wasn't really much dialog going on there at that point. After, I think, we were making more contact and talking to each other, our State partners -- Colorado Department of Public Health, Dr. Leah Colton, just with all of her expertise in getting things together and what we needed to do as well.

And then again, the biggest part is the community members -- people being aware if they're living on large property and they have prairie dog colonies around.

And then we have Pueblo West. For us, it's a very large human population area mixed in with large prairie dog colonies in between. And again, prairie dogs are just what we're looking at because we can tell if there's plague in that area; they just die fast. And it's just something that we want to make sure that we keep surveillance going. That way, we know when plague is in the area.

And so hopefully, this year we'll be working with them a lot more and can find those areas prior to any human fatalities occurring.

And that would conclude our presentation here. This is just, again, a rundown of what we did here at Pueblo City-County Health Department in the investigation process for hunting for plague. Thank you.

Thank you, Beth and Aaron.

And thank you, everyone, for attending today's presentation, Environmental Health Specialists: Fishing for Fleas. On behalf of the National Environmental Health Association and our presenters, thank you for joining us today.