Maddie's Fund

Feline Influenza Outbreak in New York City
Webcast Transcript
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Jessie Guglielmo: Good afternoon, everyone. Thank you for being here today for our webcast *Feline Influenza Outbreak*. I'm Jessie Guglielmo, Education Specialist with Maddie's Fund. Our speaker today is Dr. Sandra Newbury. Dr. Newbury is the Director of the University of Wisconsin Shelter Medicine Program and an Assistant Professor of Shelter Medicine in the School of Veterinary Medicine. Dr. Newbury saves lives and stomps out disease by focusing on partnerships between shelters, veterinarians and the community to decrease shelter intake and improve health, welfare and positive outcomes for homeless animals.

Before we start, let's talk about a few housekeeping items. Please take a look at the left side of your screen where you'll see a Q&A window. That's where you can ask questions throughout the presentation. Please get your questions in early as questions submitted later on in the presentation may not be processed in enough time for a response. If you need help with your connection during the presentation, you can clip the help widget at the bottom of your screen. This presentation will be available on demand within 24 hours should you wish to view it again. Dr. Newbury, thank you for being here today.

Dr. Sandra Newbury: Hi, everybody. It's great to have everyone here. And I'm excited to tell you about our experiences in New York City. I wanted to just start out by saying what we're talking about is an outbreak that we saw in New York City. It was primarily at Animal Care Centers of New York City, and I'm the one who is talking to you about it today just because I've got some of the information, but I am not the one, just the only one who did a lot of work.

There were really important partners in managing this outbreak and ultimately you'll see that in the end all the good news that came out of this outbreak was because of the incredible partnerships that came together surrounding making a response to this unusual incident that happened. And so I really want to talk about the Wisconsin Veterinary Diagnostic Lab that did an enormous amount of work with our program and the Animal Care Centers of New York City, of course the ASPCA and Maddie's Fund. And you're going to hear me talking about those partners throughout the presentation today.

But in addition to that, there were lots and lots and lots of other partners that you'll hear me mention as I go and I hope I'm not going to leave anybody out because this was such an incredible collaborative effort and I hope in the end that what we've done is to show that these things can be managed in incredible ways when we form incredible collaborative partnerships. I just wanted to really start out with that.

And for me personally I owe a really special thank you to Maddie's Fund because when this all started happening, as I'll come back around to in the presentation, there were a few instances where things were really pretty scary and uncertain, and Maddie's Fund was there to say that they wanted to show a better way of approaching this and the best way of approaching this and to support everyone in New York City. And that was really an amazing thing both for me and for the shelter and the community to have Maddie's Fund go in there so ready to help when really it was unclear even what we were asking for when we were asking for their help. So I just wanted to make a giant shout out about that. And we'll come back around to that in a minute.

So here is my list of everybody that I'd like to thank. We worked very closely with the ASPCA, with Maddie's Fund, the New York State Department of Agriculture, the New York State Department of Health, New York City also sorry Department of Health, USDA, APHIS, CDC, all of my staff at UW were willing to put down everything they were doing to respond to this and help these cats. My interns even volunteered to stay over their holiday, the winter holidays. Cornell Shelter Medicine helped, Cornell Animal Health Diagnostic Center, Tufts, Missouri Shelter Medicine, two amazing emergency veterinary clinics in New York City that put up with craziness from us because they just wanted to be able to help all of these kitties and they did amazing things for them and also just for anyone else that I might be accidentally leaving off this list and all the volunteers and veterinarians who showed up from all over the place to come in and help these incredibly special cats.

Even though we're talking about a case of cat flu, I'm going to start by talking about dog flu and I wanted to start because this is really what we knew at the time that things were happening. There has been a lot of work that had been done on H3N8 Canine Influenza and so that was really what we understood to be Canine Influenza for most of us living in the United States. Then in mid-March in 2015 we started seeing illness in dogs in Chicago and there was what we really came to be understood to be an outbreak of respiratory disease in the dogs in Chicago.

And this was not initially in shelter dogs at all. When we went to the shelters they weren't seeing any problems with their dogs. But we were seeing it in doggy daycare centers and veterinary practices and private homes. Influenza was reported as negative on the initial respiratory panel. Veterinarians were sending out respiratory

panels and they were coming back as Influenza negative. The reason they were coming back as Influenza negative is that they were in fact negative for H3N8, which is what they were being tested for.

What we saw as the risk factors in that particular outbreak were dogs that were going to training classes, visiting vet clinics, doggy day care and we had joked that it was a little bit of a rich dog's disease instead of a shelter dog's disease. And then what we saw was the disease moving into the shelters and I'll talk about how we recognized as it was moving into the shelter, but we haven't seen cases of dogs with this H3N2 Influenza reported in New York and we hadn't seen any of these cases reported in dogs in the New York City shelters.

Here's just an example of what H3N2 looks like as it was coming into animal shelters. And what we came to understand as we affectionately or disaffectionately started referring to as a "tidal wave." When we first looked at the shelter in Chicago there was only one sick dog. We tested the sick dog and was negative. All the dogs were negative and then we tested again and out of all the dogs, there was one positive. And then what you can see here in the little chart is how quickly it went from just a single positive dog to many, many positive dogs.

And here's just a description. Hello, we've been hit hard here these last couple of days. And she describes, you know, going from having five dogs sick to 30 dogs sick in just another day and then in just another couple of days 55 dogs sick. And so what we were seeing in the Chicago shelters was this enormous tidal wave moving into the shelter and affecting pretty much every dog in the shelter within a very, very short period of time. The reason for that is that this virus had never been in the United States before. This H3N2 virus had come from Korea, most likely, and had come to the US, so none of the dogs that were encountering this virus had any protection against it. We would expect that all of the dogs would be susceptible.

As the virus moved into the shelters that's exactly what we saw is what looked like - almost every dog and some of the shelters had 250 or 300 sick dogs all at one time. It was really a terrible situation and for many of the shelters in Chicago, the community as a whole still is really struggling with H3N2 and what we see in many cases is the shelters that are able to get the virus out of the shelter that as soon as a dog that is infected comes back into the shelter that we again see this tidal wave of activity.

And so Chicago continues to struggle with H3N2. They've done an incredible job of trying to contain it within the city so it has not spread. We see isolated instances where it had spread or where we saw small outbreaks of it, but there's nowhere else that's affected in the same way that Chicago has been infected by this particular virus.

We'll come around and you'll understand why I'm starting with this dog virus when we're talking about cats though.

We understood that H3N2 had the potential to infect cats because we had read in some reports from Korea that there were cats who had antibody testing that showed that they

had at some point been infected with H3N2, and there was even one report that sounded like maybe some shelter cats had been infected with H3N2, but during this entire outbreak that we saw in the Chicago area - where again what I'm saying is there were, you know 250 or 300 sick dogs in the shelter - when we tested the cats, we never saw positives for cats and we never saw anything unusual in terms of respiratory disease, either the amount of respiratory disease or the severity of respiratory disease that we were seeing in the cats as we might have expected if cats were, you know susceptible as the dogs are.

Then we had one case where a veterinarian contacted us and was concerned and when we did the testing, what we found was that almost every dog in that shelter was infected with the H3N2. This was a small shelter in Indiana. And then when we asked about the cats, which had become the norm for me to do, she said that, well, there is this one unusual thing that's happening with the cats. Some of the cats in this one room are drooling. And so we said, you know, let's just test and make sure, because I'm still hunting to see if it's just been dumb luck that we haven't had cats infected with this virus or you know, is it just hasn't happened yet.

So we tested the cats in that shelter and it turned out that there were eight cats in the shelter that were all infected. They were all in one room. None of them became severely ill, but all of them were positive on repeated instances and we looked at their shedding period and they all were shedding the virus for somewhere around 10-12 days. There were no other cases in that shelter and it wasn't because that shelter is so perfect that they were so, you know, bullet proof on their transmission. So we don't know what it was. We did a lot of testing of other kitties in the shelter and we never got a positive.

There was even one super sweet, shy kitty who lived up on the top and in the corner who never tested positive, and it may be because he was shy and he wasn't really interacting with people or interacting with the other cats in that room. Again, we're not 100 percent sure. But from here we knew that cats could be infected with H3N2, but we had confirmed our suspicions that it's rare, and it wasn't working in the same way that it was working in dogs - where once it came in, it was just going to spread everywhere - but for whatever reason we didn't see the spread happening within the shelter. We felt pretty clear that it had transmitted from cat to cat that we ended up

with eight positive cases. But it wasn't transmitting throughout the shelter.

In lots of ways that was really good news. And so this is the context in which the next piece of information came to us.

One thing I just realized that I forgot to say when I got started is that we have I think plenty of time to get through the material today, and so if as I'm talking you have questions, please try to get your questions in and the folks from Maddie's Fund will interrupt and let me know there's a pressing question. So if there's something I'm talking about that you're really not sure of or if you feel there needs elaboration right at the moment, let me know that, and otherwise we'll have lots of time for questions at the end as well.

So then we get a call, I get a call from Dr. Robin Brennan at New York City, at Animal Care Centers of New York City. These next couple of slides we put together with Dr. Brennan. And Dr. Brennan, luckily for her, had just started working at the Animal Care Centers of New York. Keep in mind while I'm telling this story that this was poor Robin's introduction to her new job. The Animal Care Centers describe themselves as open admission. They have three shelters that house animals and two admission shelters. And so they really have a building in each of the five Burroughs.

They have a City contract and understand themselves to be servants to the community, so as they are currently, they were open 24 hours a day, seven days a week. They take in all animals and their annual intake numbers are somewhere around 30,000 a year. This is a pretty large sheltering system and that consists of about 19,000 cats – just to put things in perspective.

When Dr. Brennan called, there was a kitty named Mimi who had just recently passed away. She had been euthanized with severe respiratory disease. She had arrived at the shelter apparently healthy and then had gone on – we'll go back into the details of her timeline in just a minute – but she had developed severe respiratory disease and was euthanized really because it was understood that she would not recover and was on her way to dying on her own. And so she passed away on November 25th. Samples were sent out from Mimi to Idexx Reference Laboratory and there was an identification of presumptive H3N2 on December 1, 2016.

Mimi's sample submission sheet had accidentally been marked as canine instead of feline, so this didn't seem like a particularly unusual finding. That was just reported out. Dr. Brennan, though, obviously on receiving that result, understood it was for a cat and contacted UW Medicine and me to ask what should we do. We have this kitty and it looks like she's probably got H3N2 Influenza. Here's where we stop and say to ourselves, well what questions should we ask here given the history of, you know,

what I just told you? And I'll have you guys just take a second and think to yourselves: what questions would you ask?

So now you know the information that I know. You know the behavior of H3N2. What kind of questions do we want to ask given the situation and the information that's come forward? What do we want to know about the other species in the shelter? What do we want to know about the diagnostics that were done? And then we also want to find out is further testing possible. And so the reason that I'm asking it in this way and having you take a minute to just think it through is that, while I would never wish an outbreak on any shelter or any community, one of the things that I found is that outbreaks are an incredible time for learning and an incredible opportunity for us to learn more. And one of the things that's really important about outbreaks is getting in front of them.

And so one of the things that happened in Chicago with the H3N2 outbreak is that we really weren't in front of it because we missed it initially. And so here we have a lot of information and understanding so we have to try to apply the information that we have to the information that's now coming to us and we have to say to ourselves, huh, does this really make sense or is there something kind of wrong here. And so one of the things that we did is that we asked a lot of those questions. We asked how many dogs were sick in the shelter. I said, you know, I'm thinking the only other case that we've had, every dog in the shelter was sick. So I asked Dr. Brennan how many dogs – do you have a lot of sick dogs in the shelter? And she was concerned that she had some sick dogs in the shelter, but that's exactly what she said. I'm a little concerned. I have some sick dogs in the shelter.

Jessie: Dr. Newbury?

Dr. Newbury: Yes.

Jessie Guglielmo: I just wanted to interrupt you real quick because we did have a question –

Dr. Sandra Newbury: Sure.

Jessie: -- that was pertinent to the things you were saying.

Dr. Newbury: Sure. Yeah.

Jessie: Was drooling a specific symptom of this virus in cats?

Dr. Newbury: By this virus you mean the H3N2 – we did see drooling in the group of cats, hyper salivation in the group of cats who had H3N2 in the Indianan shelter. The question

that you ask is a little bit tricky, though, because is it a specific symptom of this virus in cats. At this point we only have an N of eight. We've only ever seen eight cats who were infected with this virus. And so it's a little bit unclear about that.

We will come back – there's a question here and I'll answer this one that just got pushed forward too, but we're going to come back and talk a little bit more about Mimi as well. But in any case, we don't know for sure, but in the cats who we saw in this shelter, many of them were hyper salivating. And that's an unusual thing that we don't see often in cats and we did test. Often if we do see hyper salivation, we think it might be associated with Calicivirus or some other thing that's come into contact with the cat, like a chemical or something. And we tested for Calicivirus and we weren't seeing Calici in the kitties that were also infected with the flu.

So Mimi did. She came from a home. She lived with another cat and the owner was able to rehome the other cat, but Mimi was a little bit older and she was unable to find a way to rehome like the other cat. The other cat never developed illness of any kind. Mimi was reported to have been an indoor-only cat. We will come back and talk about when she became clinical according to her intake date. She was housed in a cage setting in the Animal Care Center. For now I'm going to go back to the slides.

We asked a lot of these questions to Dr. Brennan – and the first question was, are the dogs sick; well, some dogs are sick. And hopefully you're picking up on my thinking, which is that with H3N2 we don't usually see some dogs sick. We see *all* the dogs sick. So it was possible that this was somehow very, very early on in the infection, but it certainly raised our index of suspicion. There were many cats sick in the shelter and significantly more cats were sick than dogs were sick.

We knew that after the incident with the H3N8, Idexx Laboratories had decided to add H3N2 to their PCR panel and so that we knew that in fact what was mostly happening when Idexx was testing is that they were testing with PCR specifically targeted to either H3N8 or H3N2. We knew the sample submission sheet had been accidentally marked as canine and we did find out that Mimi's cadaver or her body was still in the shelter. Given all of that, we really started to think, hmm, something doesn't fit in this picture.

You know, when you're in veterinary school, one of the first things they tell you when you take a case is if you hear hoof beats, don't think of zebras. But sometimes if you hear hoof beats and you see stripes then you need to start thinking about zebras. And so this one really started to feel like it might be a zebra because all the things that we knew about the behavior of H3N2 when it infected animals in a shelter didn't really seem to be playing out in the way that we expected it to.

Our shelter medicine program at University of Wisconsin has a very, very close relationship with the Wisconsin Veterinary Diagnostic Lab and we had done a lot of work together with the WVDL on the H3N2 virus. And so what we decided to do was have the shelter submit samples to us in Wisconsin and also send Mimi's body to us in Wisconsin. I went and met with Dr. Kirth, who's the virologist who's been working on all of these things with me and I told her, you know, I'm sending you these samples. There's a cat who tested positive for H3N2, but this story doesn't fit. So let's try to see what we think might be happening. Let's see if we can look at it more closely.

So we sampled Mimi. We sampled other cats and we continued sampling all the dogs. And instead of using a very specific PCR, we used a more broad-based PCR that tested for Influenza A. All of these flus that I'm talking about today are Influenza A, and the letter and number designation describes their subtypes. When we used a broad-based testing for Influenza A, of all of the kitties that we tested we had quite a number of kitties who tested positive. And then when we did the test for just the H3N2, only one of the kitties came up positive – the kitty who had been positive for Influenza A.

And so what we decided to do was just begin the typing on the virus that we had that had come in and what we were able to find was that it was actually not an H3 at all. It was an H7. Knowing that it was an H7 made it into what we call a "reportable disease," which means we need to contact the USDA because there's a potential risk to agriculture. And so we contacted the USDA. They were incredibly helpful. Very, very quickly we were able to sequence the virus and continue typing the virus. We were able to uncover that it was in fact an H7N2, low pathogenic Avian Influenza. So when you see the LPAI, that's what that stands for.

This created a huge risk for agriculture because the closest virus that they could find as they looked at the sequence for this virus that had just showed up in a cat was a virus that had circulated in the live bird markets, the chicken markets in New York City between 2007 and 2006. It was now 2016 and that virus had been thought to have been eradicated in 2006. And so the question became, how is this virus now turning up in these cats in the shelter? At this point, we were only up to about somewhere between seven and 15 cats who had tested positive for it, but we knew there were more sick cats in the shelter, and so we knew we had to start working through things pretty quickly.

The first thing that we did was to try to establish a timeline of what was actually going on and this will answer hopefully the question that came through earlier. Mimi entered the shelter. Remember she came from a private owner, had not had access to

other animals other than another cat that lived in her home. She came in on November 12th. She had some mild ocular disease, discharge on the 14th and was treated. She then went on to have breathing problems that were identified on November 23rd.

Remember that lots of cats develop upper respiratory disease in shelters and so we're unclear again whether Mimi was actually sick with influenza when she had ocular disease on the 14th or whether maybe she had a little bit of herpes virus flare up or something like that, and that it was later that she actually developed the influenza. We don't know because there was no testing done during this time period. On the 23rd she developed breathing problems and was treated, but on the 25th she was rapidly declining and was euthanized at the time. Samples were submitted then and then Dr. Brennan contacted UW.

We began to follow up and start to plan how we would intervene. The first thing that we really needed to do was to survey the population and this is where you're going to hear me say it over and over again, how grateful I am to Maddie's Fund because I was able to contact Maddie's Fund and say hey, there are zebras storming New York City; please help because we need to figure out what is really going on. We then undertook to test as many cats as we could. My staff all deployed to New York City. Dr. Peek and I went out to New York City to see and talk with the shelter and get a sense of what was going on.

There were very large populations of cats in two of the shelters and a much smaller population in the other shelter that housed animals, but all together there were about 500 cats who needed some kind of intervention. As we began the process of collecting diagnostic tests from the cats, we could watch as the wave of infection moved through the feline population very rapidly. When we began testing, many of the cats were negative and we could watch over time as the cats went from negative with no clinical signs to positive and having clinical signs. We tested other species in the shelter as well, and the other species in the shelter all tested negative.

I see there's a question about Mimi's age. Sorry I left that out. She was about a 12-year-old cat. So she was an older cat, but she was not infirm in any way. So we don't believe that she died because she was older. We believe she died because she was very significantly affected by the influenza.

This is the time where we started a bit of a – it was an unofficial task force of agencies coming together to talk about what are we going to do with what's happening. How will we close the shelter? How will we make it so that people won't

panic? And what is the best thing we can possibly do in this situation for the animals that are involved, keeping in mind that we had to consider the risk to agriculture and the economy – because if this virus had been found or had spread to chicken farms, that would have been a very, very bad thing for agriculture and the US economy. If this virus had been found in a chicken farm, it would be most likely that the birds would have been depopulated.

One of our goals was to avoid depopulation. We were able to take the lead in terms of designing an intervention that could satisfy all the needs in terms of protection to agriculture and maximizing our life-saving potential. One of the reasons I include this picture here is that sometimes when people think about depopulation, we may forget about all the individuals that are involved. And some of these cats who were involved and got caught in the crossfire of this virus just appearing seemingly somewhat out of the blue were really just remarkable animals. Just to remind everybody that that's really where we were. We were thinking through how we can help.

Again we reached out to Maddie's Fund to say look, this is something that's going to be on the table because it's always on the table when we find a virus like this. We were getting more and more information every day. And Maddie's Fund, without really having a sense of knowing what was this going to be like – none of us really understood what this was going to be like – said yes, we are here to support finding the best outcome for these kitties.

We were then able to suggest a quarantine. We knew that we needed to evaluate risk. We didn't know at this time whether the virus could affect humans or not. We always get nervous when influenza viruses start behaving in unusual ways, because they can and do mutate frequently. Especially in instances where we see influenza viruses jumping from one species to another, that's where we start to really get concerned. We needed to think about what would be the potential cost and how could we manage to keep these animals somewhere, these kitties where it would be safe, where we wouldn't see any further spread and maybe even to keep humans safe as well.

We developed a transition plan, and we knew that our transition plan needed to stop any potential spread and also quell any potential panic that may have arisen from hearing that there is now, you know, a brand new virus that's never infected cats before, that is now affecting cats. We wanted to also trace potential spread or other cases because as you might imagine, with the kind of volume that this shelter has of 30,000 animals a year, lots and lots of cats had been released in the time since Mimi entered the shelter and even in the time since Mimi had become ill. We'll come back around to that timeline in just a minute.

Again through a generous offer from Maddie's Fund we were able to offer free diagnostics to anyone who thought that their animal in the New York City area may be infected with this virus. That was great to have people come out and do that diagnostic testing so we could really see whether the spread was widespread or whether the spread was still somewhat contained. Lots of confounding factors for us in that not every cat with respiratory disease had influenza. Lots of cats with respiratory disease may have just more run of the mill things that would cause very, very similar clinical signs.

Once we decided that what we really wanted to do was quarantine, we contacted the ASPCA who had actually been involved in many of these conversations as we were going along. The ASPCA stepped in to the collaboration to help set up the quarantine, and ultimately it was the ASPCA that took over the role of running that quarantine facility.

I want to just remind everybody that we are hoping that you'll get your questions in early so that the team has time to process them as they're coming in. I also saw that there is one question about whether Mimi was well vaccinated. Yes, Mimi had received all of that care that you would expect her to have received as, you know, as a pet of a reasonable owner. The woman who had her had taken really good care of her but had to move. I think that was the reason that she had had to give her up.

This question of human health really threw a wrench into everything because it would be much, much easier to care for animals and set up a quarantine if we were not worried that it's possible that humans may be infected. When we go to the literature, what we found was that there were in fact two previous cases where humans were reported to have been infected with H7N2, low path avian influenza. This set New York City Public Health to begin a study where they moved in and tested over 350 people that they knew had exposure to the virus and to the cats.

At first we had no one testing positive and then we had one veterinarian who had been working very, very closely with the animals in the shelter who tested a weak positive just on a single day. She tested negative the next day, but in the meantime that triggered a need for full PPE and protection for any human who would be working with these animals. That really dramatically upped the level of intervention and the level of concern, and also added a huge amount financially for the quarantine facility. Here is a picture of me and Dr. Peek and our full PPE and you can imagine trying to go all day dressed like this and care for animals in the quarantine facility. It became very, very challenging.

It also required that the animals be quarantined off site because they couldn't have the

general public coming in to do adoptions of dogs and rabbits and all the other species that were available in the shelter while there was a virus in the building that had the potential to cause human health problems. Again, in all three of the cases that have now been reported of this virus in humans, all of the humans recovered very uneventfully and only developed really mild disease, but we still have that very serious concern when we see humans affected by animal diseases.

Now we wanted to go back and really look at the epidemiology and as I'm guessing many of you were wondering as I'm seeing some of the questions coming through, where did Mimi pick this up and was Mimi actually the first cat. What we were trying to decide is how far back do we need to go in terms of looking at kitties who've left the building, or the buildings I should say, because one of the things that we found was that the flu was present in all three of the facilities that were run by New York ACC.

We went back and started looking through the data and we found that there had been this little kitten named Alfred who was so adorable. What we see when we look at Alfred's case – Alfred came into the shelter again, apparently healthy. He was a stray kitten. He was found in someone's backyard. He came into the shelter October 26th. So now we've moved our start date back significantly. He was neutered and went up for adoption on the 31st. In his adoptive home he became ill on November 4th. On November 7th he went to the emergency center because of his illness and on

November 12th Alfred died. That happened to be as you may remember the same day that Mimi entered the shelter.

We don't know whether Alfred exposed Mimi. We don't know whether Alfred and Mimi shared an exposure to another cat who was also infected. And likely we will never know the answer to that question. But it certainly raises lots of interesting questions. We don't know if Alfred came into the shelter already infected with influenza. If he did it was a fairly long incubation period when we would expect a shorter incubation period. We don't know if it's possible that Alfred was exposed after he was adopted. Possibly he was exposed while he was getting surgery. All of these questions are questions that we just don't have the answers to, but you know, it's a very interesting flu story to try to understand where the virus came from.

The USDA does regular testing and checks on all the live bird market areas and assures us that this virus has not been detected, and so the likelihood that somehow Alfred picked that up from a live bird market is very, very low. Because if Alfred picked it up, then they would have picked it up as they were doing their screening as well. So it's really a mystery. There were two additional shelters that were affected. One was in New York City and one was in Long Island. Those two shelters both

were affected because of cats who had been transferred from the original shelters. And so that was actually kind of good news. There were some cats in rescue homes as well

We never saw any cases through the entire outbreak that weren't in some way connected to this original New York City ACC case and that again was a good thing and makes us believe that somehow there was a central point where this outbreak began.

The ASPCA came in and established an incredible quarantine facility. I'm not going to go into too many details about that quarantine facility today, but want to say that there were 500 cats infected and required quarantining. As I said, we were going through and doing a lot of diagnostic testing in the shelter before the cats went to quarantine and because hundreds of samples were coming in each day, the turnaround for the samples was quick but not super, super quick.

One of the things that we were struggling with were how many cats in the building were actually exposed and if we moved them all to a quarantine, will we risk exposing some of the cats who maybe weren't already exposed. But we couldn't come up with a different way of doing it and we actually made a choice in the quarantine facility to as much as possible allow the cats to live in community spaces, because we knew that it was likely that they would have to stay in this quarantine facility for a fairly long period of time. At this point we really didn't know what the shedding period or the contagious period would be for cats who were infected because there was no way to know in a virus that we've never seen infect cats before.

For example if it turned out that the virus shed for ten days, the only way we would know that is to wait ten days and see that the cat stopped shedding, and in most cases we would have to wait even longer than ten days and see that they stayed negative for a long period of time. Then we'd be able to look back and say oh, after about ten days they're done. So there were lots of unanswered questions about the course of disease and defining the cure. We didn't know how sick the cats might get and we didn't know how long they would stay. We also were a little bit unsure about the safety for the workers and whether other people might become sick. We weren't 100 percent sure of the treatment choices as well, but we decided we were going to go and do this.

What we did in the quarantine facility was house many of the animals communally. We felt that would be so much better for them, and what we didn't want to do was take a lot of cats and put them into a facility in individualized housing and see them all get sick from herpes virus because they were so stressed by being in, you know, small caging units. We made a collective decision to put them into larger communal housing, and we never regretted it for a minute. That's one of the things I wanted to

make sure that I did cover.

One of the things that was a huge sigh of relief to me was as the diagnostic testing was finalized and coming in, we found almost all of the cats who became positive at some point during the outbreak, which was most of them, were almost all positive before they ever left the shelter. We didn't end up increasing anybody's risk by giving them communal housing. I think we did dramatically improve their welfare by giving them lovely, large, enriched spaces. We made a nice place for the people who were there and trying to work with the cats. They could go in and sit with the animals in these larger enclosures and work with the animals, and the animals could have the company of their own kind.

We also set up *some* individual housing for animals where we felt it was a better solution. Some animals we thought wouldn't necessarily do well with other cats. It was the NYC ACC team that actually went through when we were planning to move all the animals to the quarantine facility, it was that team that went through and made the behavioral evaluations and the pairings and figured out who would do well with each other; who would live well together; who would do better in an individual cage.

We ended up with a two-story quarantine facility that had a downstairs floor and an upstairs floor. The quarantine facility was in Long Island City. ASPCA did an unbelievable job of getting that set up so incredibly quickly. They did a search for a property, found the property and got the whole thing set up in what seemed like practically no time at all and began operations very, very quickly.

The outcome was really more than I could have – better than I ever could have possibly hoped for. So the shedding period – we were able to define the shedding period through extensive testing and follow up. We followed cats forward, watching when they stopped shedding, and then would arrive at a hypothesis of when we thought their shedding would be over, and watched the rest of the cats. Cornell University helped us by looking at antibody titer testing so we could see that in some cats who tested negative – there were some cats who tested negative all along. We never had positive tests from them.

One of the things that we still wonder about, and we're not done going through all of our data yet, is maybe some of those cats may have actually been the first cases because they tested negative throughout but then when we went back and looked at their antibodies, they were antibody positive. It may be that there were some positives in the shelter before Alfred and before Mimi. It may be that both Mimi and Alfred were exposed because the virus was in the shelter.

The great news is we've had no new cases of H7N2 or positive tests reported since

February 5, 2017. So it looks like this virus may be gone. We hope it's gone for good this time and not like it was the last time. We hope it will be gone for more than 10 years and that the vast majority of cats recovered. Very, very few cats died from the influenza. There were some other viruses, more common viruses of cats that we wrestled with a little bit in the quarantine facility. The emergency clinics in New York City stepped up and helped in just an incredible way in that they would get a cat stabilized and cared for.

The rescue groups were incredible. Basically we would clear the animal of influenza so when we knew the animal was free of influenza, we'd be able to send them out to clinics. And then the rescue groups, rescue partners all around New York City would come and collect the kitties and bring them out to foster. It really was just the most amazing partnership to see what could happen when everybody worked together in such a strong way. We are still asking, did we win? Was it worth it?

What an amazing thing to not have a new virus of cats in animal shelters. There really could have been the possibility that we would see that, you know, now cats would have herpes and Calicivirus and panleucopenia and influenza would just be a thing that cats would have, so we're super happy that it seems like that is not the case. That is really, really thrilling to us. I think we won because of all of those reasons and more. Only time will really tell us about the virus. Time will tell if this virus comes back.

We have done an extensive follow-up. Ever since February (2017) and before February as well, we've tested almost every sick cat that has shown up at the shelter and we have not seen any influenza at all. We've been using our broad-based PCR test just to be sure even if there was some mutation that we would still pick it up, and we've not seen any influenza whatsoever.

The other thing that I think is really the piece where we won is that Dr. Brennan had just started at New York City ACC, and this outbreak, though I never, ever wish an outbreak on anybody, it caused the shelter to really stop and reflect on what happened and how it happened and how they could set things up. I think it put us all into a never again framework. We started looking at the shelter and the way the shelter was set up and asking ourselves what could we do to set it up so if something like this happened again; it would be more controllable.

One of the things that we did notice is that in the other two shelters that were affected by influenza, the influenza didn't spread as much as it did in the ACC shelters. We can look at that and say, wow. Why was it that they were able to control it better than these other two shelters and that we saw so much less spread? This is Dr. Brennan's

slide and I think what happened was that there was a perfect storm. First of all, the virus coming in unrecognized. How would it come in recognized? It wouldn't because this is a brand new thing that no one has ever seen before. So nobody was sitting and waiting for it. There's nothing they could do about the fact that it happened to be that theirs was the shelter where this virus appeared.

But at the time that the virus came in, there were 631 cats in the shelter and 343 dogs. That is a huge number of animals for them to have tried to care for at any one time. They themselves recognized they were operating well over their capacity for care both in terms of their space, their housing and the staff that they had to care for the animals.

The animals were housed primarily in single-sided housing units and so cleaning was difficult. In some areas there were additional housing units added to try to manage more animals at once, but none of that was really helping them. It wasn't maximizing their lifesaving capacity. It was expending resources in unproductive ways.

Even though they were doing quite well in terms of their live release for animals, there was a lot of disease. When we talk to stakeholders in the community, they all said yeah, you know, it's really hard because a lot of the animals that come out of the shelter are sick. In many ways there were unrealistic expectations within the shelter and in the community as well. I think now they're really on the most incredible road to recovery, and I have long wished for an animal control agency, a large, municipal animal control agency that I could send people to and say hey, look what they're doing because it's really amazing. But everybody keep your eye on what's going on with Animal Care Centers of New York City because there's really exciting things that are happening there.

We went out and we put portals in all of their cages so now all of the housing units for cats in the shelter are double sided. Each cat gets two housing units with a hole in the middle so they have a living room and a bathroom. They've got new policies. They have a managed way of bringing animals into their shelter. They're doing some fast tracking for animals that don't need to stay a long time, and also doing what we call open selection, where animals can be preselected even when they're in their stray holding period.

What we're seeing are significant reductions in length of stay which is amazing, and those significant reductions in length of stay are leading to having fewer animals in the shelter at any given time, though they’re still serving all the same animals. And by having fewer animals in the shelter at any given time, the level of care that's being provided is skyrocketing. That is really super exciting. We are still working with them. I couldn't be more proud of being involved and working with this team of

people at the shelter. It's just been incredible to see. Maybe we'll come back in a year and talk about where they are now, because it's really incredible.

Now they have fewer cats since the last time Robin made this slide. They have only 149 cats, significantly less disease, happier staff, happier cats. Lifesaving is going up and this is what they have said about their own experiences: that they feel like they took lemons and made lemonade. This was such a hard and scary experience to be part of, but we couldn't have had a better team of people working on it. I've been so impressed by everyone from all the agencies in New York City and every other agency that worked on this.

I don't know that any of us would really have believed that we would be able to potentially eradicate this virus and have it not spread beyond the outbreaks that we were working on. That was a tribute I think to how well the ASPCA managed and stepped up for things, how well all of us were able to just put our – everyone who was working on this outbreak took everything they had and dropped it to focus on this and in the end, it was just the best team ever. And that's why we were able to actually do it.

We have time now for questions.

The first question is: What was the method of transmission determined to be? What we expect for influenza normally is that it would be direct, cat-to-cat. It would probably be bodily fluids as well, but also some air-born risk. In general we don't expect there to be air-born risk from cats because we have studies both with herpes and Calicivirus that show us that cats' little, tiny lungs just aren't quite big enough to do true aerosol transmission. So they don't get the virus up in the air in an aerosolized way. But one of the things that we did was – the CDC did it – came in and sampled the air in the quarantine facility in various places.

What they did was mostly sample the air near where the cats were. They did in a few cases recover virus from the air. But we all think is that probably that has more to do with humans walking through and kicking things up or time that humans spend cleaning. So there was some virus in the air, but probably the primary mode of transmission is what we would refer to as fomite transmission, which is that the virus probably traveled from peoples' hands, from one animal to the next or on equipment or scrub shirts or things like that.

Next question. What clinical signs did the vet see in Mimi that made them run the respiratory panel on? I'm really glad you asked that question because I think Dr.

Brennan gets major kudos for having sent in that test and also having sent the test – it was Dr. Brennan. I think it was someone else who sent the test on Alfred earlier. What they saw was an animal who died suddenly whose condition declined suddenly and unexpectedly. The clinical signs were just very severe respiratory disease.

Many shelters I think skimp on diagnostic testing, but when you have an animal that dies in an unexpected way, that's a great time to just do some screening testing. The amount of money that you spend doing that screening diagnostic testing may be the difference. I think this case is a really good example of it, of being behind or in front of an outbreak that's coming. The main thing that triggered the respiratory panel was that she declined in a very unusual way.

She was a cat who came in healthy. She had had a little bit of eye discharge and then all of a sudden had such severe respiratory disease that she was just mostly dying by the time they euthanized her. That decline was so rapid. I want to make sure everybody understands that. It had seemed that she was going to be okay and then just very, very rapidly, she declined. When we did the necropsy on Mimi – and we'll be putting out some of this information in publication and in a couple of other cats who died – again, people keep asking about a rate of mortality.

We haven't really done all the data to be able to tell you that, but to understand that there were really just a handful of animals who died because of the influenza. But in the cats who did die from the influenza, we saw really significant changes in their lungs. We saw what we would call necrotizing pneumonia. The virus really dramatically affected their lungs.

One of the things that we know about in cats is that they are not really great at showing us when they have clinical signs of disease. If they have something that feels terrible but we can't see it, they may just sit around like a potato for a couple of days and we won't really have a sense of what's going on. That was really interesting for us to learn.

There was another little kitten who had been doing really quite well. We knew she had the influenza, and we knew she was sick, but she hadn't seemed really, really sick. And then all of a sudden she got much sicker. She had cleared the flu and we sent her to an emergency clinic and from there when we took radiographs, her lungs just looked horrible and she ended up needing oxygen for I think almost two weeks just to allow her lungs to recover. Influenza likes to target epithelial cells and what we see also was targeting the lungs. Those are the kinds of signs that we saw, but often we didn't see them so much as clinical signs because the cats weren't making those signs obvious.

Next question is: How did we prevent panic while offering free diagnostics and how did we frame the offer. You can look. We put out some press releases about it. We partnered with both the Mayor's Alliance in New York City and some of the other big rescue group partnerships in New York City. We made the offers. The New York Times published an article. The New York Post published a couple of articles. There were many, many articles. There were a couple of news stories on the radio and we made these offers and what we decided was that transparency was the best way of trying to prevent panic. By saying to people here's what's happening. We are aware of what's happening and we are on it. We are working on this. We know what's happening and we are here to help you if you have questions and to help you understand what's going on.

The only thing, there was one instance, one thing that I wish had not happened is that because there was all of this fear surrounding agriculture, there was at least one case where an animal tested positive. The public health department in that community responded in a way that I think induced fear for a lot of people and would make it less likely that others would come forward by quarantining the house where that animal was. But again, I don't think that really went to panic. It was just a way of everyone got so nervous and we wanted to be sure that we were protecting both the animals that we were concerned about, these cats, the agricultural markets, the US economy, balancing all of those things at the same time. We met with the rescue groups. We explained what was happening and we closed the shelter and then began to investigate and tried to give people as much information as we possibly could.

The next question is: Any plans for a development of a vaccine and do I think this was an isolated case? We will probably not see again of this specific strain. That is certainly my hope. Some people call me a hopeless optimistic, but I really hope that that's the case. I am not sure if the vaccine companies are thinking about making a vaccine for the virus or not.

It might be great to have a vaccine for this virus if the virus came back, but on the other hand, we know that in many cases, influenza vaccines are partially protective and they're usually killed virus vaccines, so they may not be as helpful as what we wish they would be in a shelter setting. I guess one of the things that will probably determine that, though I'm certainly not the one who would develop the vaccine, would be how likely it is for this virus to come back around again. And what I hope is that we made it so it's not necessary, but we will see. Only time will tell that.

The next question is: In canine influenza antibiotics are used. Did these cats receive antibiotics as part of their supportive care? Yeah. We're not trying to treat the influenza when we're using the antibiotics. What we're trying to do is treat any secondary antibacterial invaders. A very similar approach that we used is just giving

these animals the broad spectrum antibiotic coverage and trying to support them as best we could in terms of trying to make sure they were happy and comfortable, clean, well fed, eating well and had any other medical issues addressed and that they remained hydrated and all of those things.

The next question is about mentioning concurrent Calici and herpes infections and did that alter the treatment protocol at all. It did alter the treatment protocol for the cats where we were seeing that. Again, because we were doing so much diagnostic testing, we know when those viruses were appearing and so we did try to treat further. Again, primarily supportive care, but we did try to treat for those viruses the best we could. We're working on collecting some of that data and we have plans for publishing some of the information on some of the viruses that came through. Those mostly came through after the influenza was going away.

The next question: Have citizens of New York City showed any changes since this to decrease the number of animals being surrendered? That is a great question. I do know that during the time that the shelter was closed to intake, the community was incredibly responsive and incredibly supportive. Both the rescue community and the public seemed to completely understand that the shelter needed help and we were able to really dramatically reduce the intake into the shelter during that time.

The shelter is working now on a different way of having animals come into the shelter, so there's definitely some changes in the way animals are coming in and some decreases in the number of animals being surrendered. One of the things they were able to do was to set up intake facilities, a mobile area for intake so that we could stop adding fuel to the fire of what cats were going into the already exposed group. We did at one point make what we call a clean break, so that we could have animals stop being added to the group of animals who needed to be quarantined.

That was another place where Maddie's Fund was incredibly helpful and offered some incentives to the rescue groups to come and take. We would have animals come into these mobile facilities and then the rescue groups would come and take the cats right away to keep them from having to be added to the exposed group. If we weren't able to do that, we could have ended up with, you know, two to three times as many animals who needed to be quarantined.

The next question is: What number of volunteers were utilized from the public and number of people it took to handle it to the end? The ASPCA would have the numbers that they used in their quarantine facility. I have that somewhere, but I'm sorry, I didn't put that in the presentation. It was a huge number. You have to remember that that's not all. Right? It was everybody who worked in the quarantine facility. There were huge numbers of volunteers at ACC, volunteers at the other two

shelters that were affected.

I think the emergency clinics were certainly not volunteering, but I can tell you that the veterinarians and the technicians in those shelters were working so incredibly hard to care for these animals. It was really an enormous number of people and we're collecting all of this information so we can put out some publications about this whole story. We'll have all of that when we pull it all together.

Jessie: Dr. Newbury, this will be the final question for the afternoon.

Dr. Newbury: Okay. The question is: Is this virus now included in laboratory respiratory panels? That is a great question. I can only speak for sure about our lab. At our lab in Wisconsin, we still do the Influenza A testing. So that if this virus or any other Influenza A virus came in, we would recognize that it's an influenza A virus. I believe that is what most of the commercial labs are doing as well at this point, but I'm not sure and it really depends on each lab, what they're running.

What we would do is the first time we're working on a particular situation, we would try to type and make sure we understood exactly which of the Influenza A viruses we're looking at. Even in the Chicago area at this point, when we get the dog samples we test at intervals to make sure that the virus that's coming from that area is still the H3N2. These are scientific laboratory questions about which test they choose to run and so it is not always run, but I think most of the laboratories agree at this point, now that we've had two cases, that running an Influenza test when you're doing a respiratory panel for cats is probably a really good idea.

Jessie: Thank you, Dr. Newbury. That was our final question for the day. We want to thank all of you for your time today and a very special thank you to Dr. Newbury for a very amazing and interesting presentation. Be sure to join us on Tues, June 6th at 9:00 PM eastern for our next webcast, *Managing a Panleucopenia Outbreak in a Shelter* with Dr. Amanda Dykstra. For more information and to register please go to Maddie's Funds' website. This webcast is on demand and we hope you will share this presentation on your social site. Thank you again for being here with us this afternoon and have a good rest of your day.

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