Taking the Teeth Out of Canine Distemper Virus
Webcast Transcript
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Canine distemper virus (CDV) is one of the most preventable infectious diseases we battle in animal shelters. As reassuring as that sounds, outbreaks continue to be a problem for sheltered dogs. In a free Maddie's Fund® webcast, Sandra Newbury, DVM, Director of the University of Wisconsin Shelter Medicine Program, will help shelters understand how to prevent distemper outbreaks, how to recognize the disease in its earliest stages, and what to do in response to an outbreak.

Learning Objectives:

- To understand the basics of the distemper virus and its spread
- How to use vaccination most effectively to prevent outbreaks
- How to protect dogs in your shelter from CDV transmission
- How to identify susceptible dogs
- Special risk factors for puppies
- The clinical signs of CDV
- How to diagnose canine distemper
- Elements of effective outbreak response
- What to include in a long-term response plan, and why you need one

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[Beginning of Audio]

Jessica: Good evening everyone. Thank you for being here tonight for our webcast, *Taking the Teeth Out of Canine Distemper Virus*. I am Jessie Collins, Education Specialist with Maddie's Fund. Our presenter tonight is Dr. Sandra Newbury.

Dr. Newbury is currently the Director of the University of Wisconsin Shelter Medicine Program. She helped build the UC Davis Koret Shelter Medicine Program, and served for six years on the Board of Directors of the Association of Shelter Veterinarians. Dr. Newbury's focus is on partnerships among shelters, veterinarians and the community aiming to decrease shelter intake and improve health, welfare and positive outcomes

for homeless animals. She is giving a fantastic presentation tonight, so get ready.

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. There is a Certificate of Attendance for attending this live event, which you can access in the Resource widget at the bottom of the page.

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Dr. Newbury, thank you for being here tonight.

Dr. Newbury: Hi everyone. I am presenting to you tonight from the romantic candlelit confines of my office. I have no power, so you will be hearing me asking to have the slides advanced. I am looking at the slides on my own computer, and Lynne Fridley will be advancing slides for me. We're hoping my phone will hold out, and let's just take it from here.

So I'm happy to be here tonight. We have been really working hard on canine distemper virus in the last five years, and especially so I would say in the last couple of years we've been really learning an enormous amount of information. So I'm excited to share that with you. Made a huge amount of sort of positive progress in terms of management and lifesaving surrounding canine distemper virus. So can we go to the second slide?

I wanted to start out by thanking Maddie's Fund and the ASPCA for funding the diagnostic testing over the last couple of years. Especially we've been working with a lot of shelters, working through the outbreaks in incredibly lifesaving ways. Finding whole new strategies for how to approach outbreaks, and as well as really individual animal illness, and finding that even though canine distemper is a really serious and significantly life threatening disease, that we can approach it in ways where the number of positive outcomes just shine through. So that's been really, really exciting. Let's go to the next one.

So tonight what I'm going to do is kind of go through all the way from the very basic sort of kind of what canine distemper is all the way through some of the new information that we have, or how we can manage things. And I'm really happy to take your questions, so please make sure that you put your question in and we can stop for questions if they're thing that are

confusing as we're going. And I think we'll have time for questions at the end, as well.

So canine distemper virus. It's an enveloped RNA virus, and when I was in veterinary school and people started talking about things like that it was like, oh my gosh why do we have to learn that piece of information? Well the things that are important about that is that if a virus has an envelope, it can't survive without an envelope, and envelopes are actually really pretty easy to get rid of. So enveloped viruses are usually easy viruses to kill, and thank goodness, that's true of canine distemper. It's kind of the opposite end of the spectrum from a parvovirus. Almost any disinfectant will get rid of it.

Dogs and ferrets are susceptible to it. Raccoons and other wildlife species, as well. It is not the same as feline distemper, so we hear people say sometimes that kittens have distemper or cats have distemper, and it's really important to recognize, it's really not a distemper virus at all. That is panleukopenia when people say that. That's usually what they mean and panleukopenia is itself a parvovirus, so it's much, much more like canine parvovirus than it is like canine distemper virus.

Clinical signs that we can see. We can see those clinical signs in individual animals, and then often we'll talk about either kind of group signs. I joke sometimes and say, "Well that's a herd sign." And so we're going to talk through all those different things that we might see in an animal absolutely no signs at all. So we might see infected animals that don't have any clinical signs. We might see sub-clinical or inapparent infections in that way.

There can be a really wide range of affected systems. It's a, it's one of those illnesses that when people are in vet school if they hadn't seen canine distemper, and this was certainly the case for me, that people will worry. Oh, I might not recognize it when I see it, because it can affect so many different systems and prevent in so many ways. It does have a really incredible range of severity too, all the way from hardly any clinical signs to neurologic seizures and death. So that's important to recognize.

One of the things that I think is really big news for me in working through the outbreaks we've been working through the last couple of years is that it turns out with good supportive care and treatment and we'll come back around to that a little bit. Actually most dogs – many dogs and in most cases most dog will actually survive. We'll come back around to this again, as well.

But once the disease has progressed to neurologic signs the prognosis drops significantly, but for dogs who are really on the primarily in the

respiratory stages being many of those and in fact, in what I've seen is that most of those dogs will recover. And that's a real difference from what you see in a lot of the literature and it's a real difference for me in what we thought when we initially started sort of working with canine distemper, especially in animal shelters.

So the kind of key notes that people think of when they hear canine distemper are the neurologic signs, and those can be anything from kind of a grand mal seizure to what we call a chewing gum seizure, which is kind of like a little twitching in the jaw. And what it looks like is a lot like chewing gum.

We can also see these ocular signs that are squinting or blinking. That can come from Uveitis or we can also see sometimes ocular discharge that looks like what we would see, especially like in a cat with a URI, what we're seeing in a dog instead. And as I said, the prognosis falls once the neuro signs develop. So sorry, I forgot to ask to have the slide advanced to that neurologic and ocular signs like.

Lynne: I'm keeping up with you, Sandra.

Dr. Newbury: Thank you so much. And so with this dog, I'm not sure how well you can see on your screens, but this dog, it has really the kind of classic squinty, looks like his eyes hurt. Looks like he's got a headache, as though I sort of think about these dogs looking. And these dogs really don't, so let's go to the respiratory disease slide.

So we can see nasal and ocular discharge. We can see wheezing, coughing, troubled breathing. I included a picture of this dog, because I really want you to see, this dog is not a dog who is pulling on his leash. His stance and his lowered head, what he's trying to do is breathe. He is really uncomfortable. It's difficult for him to breathe, and they will often sort of develop this kind of way of standing. So if you see this in the kennels again, this is not something that indicates that that dog has distemper, but it is something where you want to check into what's going on because the dog is very likely having a difficult time breathing.

When you're seeing a lot of cases of pneumonia, canine distemper should certainly pop up onto your list of possibilities, and sometimes when pneumonia is directly related to the canine distemper, sometimes what we see is a secondary pneumonia that developed. Many people don't think about this, but canine distemper is a very significantly immunosuppressive disease, and so we can often see the dogs developing a secondary – really severe secondary pneumonia because they don't quite have the immune function that they need to fight that off. Let's go to the next slide.

The other big thing that we can see with canine distemper is gastrointestinal disease. That's the biggest one probably that we see as the co-factor, so kind of a hallmark that people think of is neurologic disease. Much more common in shelters is the respiratory disease without the neurologic disease, and gastrointestinal is probably next up, where we'll see GI signs like diarrhea probably is the most common. Sometimes vomiting.

One of things that again is kind of a hallmark is when you see dogs waste away in a way that seems sort of seemingly impossible how quickly they can lose condition and lose body mass, and so that's another thing that should really kind of raise your suspicion and have you worry about canine distemper.

We can sometimes see a pustular dermatitis that happens more commonly in puppies. It's not a super common thing, but it is definitely on the list of things where I got e-mails from shelters saying, "Hey we have this group of puppies. They have URI. Now they have this rash on their belly." And I get that sinking feeling, and so then we start looking into it further.

Hyperkeratosis, which is kind of a thickening of the skin on the feet. This is called a hard pad disease that we can see in dogs that have had distemper. It's usually something that develops a little bit later, and we can also see something like that happening on their noses, as well. Let's go to the next slide.

The one of the things that I think is really important, especially for shelters is to be able to recognize what the group signs of this disease are, and because you may see it in individually in one. It may even sometimes go unnoticed in an individual animal, but what we're looking for is an unusual or a high number of dogs affected with something that looks like kennel cough.

Pneumonia in your population or pneumonia in your dogs, you know, that's somewhat frequent. Some dogs that progress to neurologic disease and usually the dogs that you'll see that progress to neurologic disease really sadly are the puppies. We'll come back around to that. So one of the classic kind of shelter signs of a problem with canine distemper is a shelter that tells me they have a lot of regular kennel cough and every now and then they have a puppy that gets kennel cough and goes on to become neurologic. That's a real red flag kind of herd sign for us.

Post-adoption reports of neurologic disease, because often it takes a little bit longer for the neurologic disease to develop, and so even though oh, you know, they had a respiratory disease. They were covered, and then

they get adopted and go on to develop neurologic disease. That's one of the things that makes us really start to worry.

None of these things, just so we're clear, none of these things alone says to us, "Oh, there is canine distemper in this shelter." But any of these things together are things that should kind of raise your index of suspicion and have you check into things a little bit further to figure out if that is the problem, or a source at least of the problem that you're seeing. Let's go to the next one.

Canine distemper has about a one to six week incubation period, and this is a slide that I have actually changed since I have given this presentation more recently, because we used to think that the most common onset of illness was a little bit later around three weeks to five weeks, but in my experience in the last couple of years what we're really seeing is that the onset of illness comes a little more quickly than that.

So the most common time is probably anywhere from about a week and a half to two weeks up to about four weeks, but we still do know that it can be as long as a six week incubation period.

What we usually see or don't see, as I'll explain, is that there is a fever spike about three to six days post infection. Most of the time that little fever spike is missed, because it's very short and it usually resolves fairly quickly, and so it's not until a little bit later that the signs of respiratory disease develop and that's when people start to notice that there is something wrong.

Transmission, it's a very, very highly contagious disease. The real root of infection most commonly is direct from dog to dog. Aerosol transmission is a reality, and fomite transmission is also a possibility, but remember as I said, it's a reasonably easy virus to kill, so if you're following good practices in terms of trying to control fomite transmission that kind of transmission is a little bit less likely. When I say fomite transmission what I'm talking about is the virus traveling from one dog to another dog on your hands, on your shirt, on a piece of equipment.

Environment is a little bit less likely, again because it's easy to kill in the environment, but you do need to disinfect. So even though almost all standard disinfectants are likely to kill the virus, you do need to do some careful disinfecting. There is no zoonosis with canine distemper, so it's not a virus that humans can catch from dogs. Let's go to the next one.

As I said, direct is the most common means of transmission, and it's important to really think about how you define direct transmission. I included this picture because this is, you know, somebody might look at a

kennel map of this shots or, and think, "Well that dog was never in the same kennel as those other two dogs." But if we're tying dogs out and we're allowing any kind of nose to nose contact, then that's something that does allow for direct transmission.

So improperly used housing, especially housing where the guillotine doors are down, and each dog only has one compartment so you can't move them from side to side to clean puts shelters more at risk of that kind of transmission. Tie outs for cleaning puts shelters more at risk. Yards during cleaning, if you've got yards where all the dogs are touching noses, again it puts you more at risk.

I want to be really clear. I'm not saying that I don't think shelters should have play groups. I am an enormous fan of play groups. I just think that shelters should be screening for clinical signs of disease, and doing a great job vaccinating dogs on intake to figure out who is going to go out into the play group. So just to be clear about that. We'll kind of come back to that a little bit too.

As I said, aerosol transmission is a reality. We've known that for a long time, that canine distemper in a big dog is able, you know, a cough from a big dog is able to send that virus about 20 feet by aerosol transmission. Even though we know that's true, what we've seen in practice is that aerosol transmission doesn't seem to play as big a role as you might expect it to, given that we have this research that shows that this kind of transmission is possible.

We've worked with lots of shelters that have been able to isolate infected dogs and sick dogs in one area of the shelter without seeing that there is a huge risk from the aerosol transmission. So in an ideal world you would protect both from direct transmission and from aerosol transmission, but in the imperfect world that we all live in, what we've found is that controlling for direct transmission and fomite transmission can often be good enough. So that's just sometimes we like to say, "Well here is what we really want." And then if we really can't get it, what are the other choices. Go to the next one.

Fomite is definitely a reality over short distances, and so we really want to think about that when we're thinking about staff and volunteer handling. And so again, if we're trying to isolate dogs for canine distemper, we'll come back to this, but we want to make sure that the staff that are handling the dogs that are infected or might be infected are being extra careful not to handle any other susceptible dogs. To have a change of clothes. Wash hands. All of those things are super important.

Lynn is going to try her best to do this click through animation for me. The idea here with this environment and the co-mingling is to really think about what happens if you have only one dog in a run. You would think of the exposure risk as just being one. The minute you put a second dog into the run, now the exposure risk for both dogs goes to two. So both dogs have an exposure risk of two. You add a third dog. Now the exposure risk goes to three.

And so that goes on. Say you have five dogs in a run. That's great, so now you get up to an exposure risk of five, and let's say one of those dogs has canine distemper. Even if the other four dogs all leave, the exposure risk in that kennel stays at five, and if you add a new dog to that kennel, the new dog will pick up the exposure from the dog who was there. So by having this kind of random co-mingling, where you never bring the exposure risk in that kennel back to zero, you increase the risk of distemper.

And this one I have, I tried to include this though, because this is one of the biggest risk factors that we see. The importance of singly housing animals, especially until their vaccines have had a chance to take effect can't be overstated. It's a really, really important strategy for managing populations of dogs in animal shelters to avoid canine distemper.

So does that mean you can never co-house dogs? No, absolutely not. You can co-house dogs that come in together because their exposure risk is already the same. You can co-house dogs after they have had a chance for their vaccines to work. That's one strategy, but again, in doing that what you want to do is co-house dogs because it's better for the dogs, not because you don't have enough space.

So we prefer and recommend that you manage your space with good population management matching your intake so that your possible outcomes is best you can, rather than thinking that the kind of way I would say it is, random co-mingling or putting two dogs together that really is not in their best interest is not a way to save a life, because what happens is you increase the risk of infectious disease for everyone in your shelter by doing that. And so we've got lots of shelters that have worked through that process, and came out on the other side really realizing how beneficial it is to get each dog in their own housing unit.

Viral shedding is a really, really tricky thing with canine distemper. So we can have inapparent or sub-clinical shedding in dogs who are exposed and also in dogs that are recovered. Post-recovery shedding is usually less than about four to six weeks, but with some dogs that post-recovery shedding can go on for a really long period of time, and so we like to warn shelters that that's a possibility, even though in most cases it doesn't happen, but

we do have some dogs that we're still following, or some dogs who continue to be PCR positive for really long periods of time.

We're in the middle of kind of doing some research trying to figure out, do those PCR positives still pose an infectious risk and we don't have all the answers to those questions at this point.

It is a rare, but very real issue, and we're hoping that we'll have some more answers to those questions in the year to come, but for right now, the infectious potential is unknown for these really long-term shelters. It's thought to be low, but our recommendation still is to take those very seriously, and continue to keep those dogs away from susceptible dogs until we have a negative PCR testing. We will come back and talk a little bit about PCR in a bit. Next slide please.

So this is just a little bit of lab results from antibody testing that we did from some shelters. What we did is, we looked at a few different shelters in different communities and we did some blood testing as the dogs were coming into the shelters so we could see how many of the dogs were susceptible as they were walking into the shelter. And what we found is that it varies really largely by community.

The response to canine distemper is primarily what we call a serologic response, so antibodies in your bloodstream or in the dog's bloodstream is what's responsible for clearing the virus. And so if animals have really good levels of antibodies in their blood already, which they get either from previous exposure or from vaccination, they will be protected from the virus.

What we saw was 64 percent susceptibility to canine distemper virus in some communities, and in other communities we saw as low as like a 20 percent susceptibility to canine distemper virus. So it's really important to understand that lots and lots of dogs coming into animal shelters may actually not be protected for canine distemper, and this is one of the biggest reasons that we so strongly recommend that shelters vaccinate on intake.

Puppies under 16 to 20 weeks of age should always be assumed to be susceptible, even though many of them will be protected. I'm going to come back and talk about that more specifically in just a couple of slides, but it's because of maternal antibodies. They have maternal antibodies that may interfere with our ability to successfully immunize them when we vaccinate them. Let's go to the next slide.

And you know, I included this slide. The dog on the right, the older dog is actually my dog, who was a lucky dog. He ended up in a shelter that

vaccinated him on intake at ten months of age. He came to my house. He spent his entire life protected from distemper, really because he received two vaccines early in his life.

I was working on an outbreak with the shelter and they sent me some of the pictures of the dogs who were infected, and this little – this picture of this little pup came through and it really struck me how luck plays out for different animals. This little pup ended up infected with distemper and she survived.

But I really wanted to show just the luck of the draw is really like whether or not you get vaccinated is so incredibly important, and here are two dogs. They look the same. They share so many of the same things. They both turned up at shelters. One turned up at a shelter where he was lucky and he got vaccinated on intake.

The other one showed up at a shelter where she didn't get vaccinated on intake, and she actually also happened to be in a young age group, where she ended up susceptible to the disease. And so this is my slide as a means of really talking about how incredibly preventable this disease is. So let's go on to the next slide.

Canine distemper virus vaccine is one of the best vaccines we have going. It is not quite a magic bullet, but it's as close as we can possibly get. We are so lucky to have a great vaccine like this. All of the major manufacturers make canine distemper virus vaccines that are about equivalent in terms of their efficacy, and they are all really astonishingly efficacious.

We have research to show that the vaccine starts to become at least partially effective within four hours of administration and there is really no other product that we know of that we see that kind of rapid response.

One thing that's important to understand with that vaccine and that early onset is that it doesn't – the early onset of protection is just a partial protection that protects from development of neurologic disease and death. What it doesn't protect from is infection, and what we often will see in shelters that vaccinate on intake and then expose the animals within the first three days, is we see dogs that many of the dogs will get what looks like kennel cough symptoms.

And this is what I was talking about, where we'll see a shelter where most of the dogs about kind of kennel cough symptoms, but then the puppies, who we couldn't necessarily effectively immunize, because of their maternal antibodies, those puppies will go on to develop neurologic disease. And so that's where that kind of red flag situation comes from.

It's a magic bullet, but not quite because you can't vaccinate a dog on intake and then immediately put them into a kennel with another dog who has distemper. That won't work. They'll still go on and get infected, because the vaccine can't work that quickly.

And because it provides this partial protection, even though the dogs don't look like they have canine distemper, they may be infected with canine distemper, and so it may become an ongoing situation in the shelter where you're vaccinating dogs on intake, exposing them into large numbers of dogs in the shelter can be shedding canine distemper, even though they're only getting mildly ill.

Vaccine handling is also incredibly important, so it's a great vaccine, but remember what I said about how easy it is to kill this virus. So this is a virus that's going to die in your multiple vaccination and your combo vaccine. If you mix it up way before use, if you allow it to sit out at room temperature, if you allow it to sit out in the sun and you're in a hot climate, this is the virus that's going to die first.

And then when you go to give that vaccine that's the component that's not going to work as well. So vaccine handling is really most important for CVV compared to any of the other components in your vaccine, and that's kind of your drawback of having a virus that's easy to kill. Let's go on.

Time to onset of immunity, so I'm talking about, you know, we can see this great partial protection start to develop even four hours after vaccination. We've known that for a long time. Sterile immunity for most of adults and susceptible pups develop in about three to five days. Again, that's really phenomenal.

We're so lucky that we have vaccines that can work that well, but remember, that's what develops if they're not exposed before then. So the importance of vaccinating dogs and then keeping them protected from exposure early in their shelter stays, again can't kind of be stressed enough.

So here is some of the research on the vaccine. This is a study that we saw in way back in 1967. Twenty-one susceptible puppies in ten litters were vaccinated with a single dose of combined vaccine. They were exposed to the virus and only 1 of 21 vaccinated puppies became ill and 14 out of the 16 non-vaccinated littermates died. So and these are puppies who were immediately simultaneously introduced into this contaminated environment.

So this is how incredibly well that vaccine can work. And I include this study, because I think this study comes sort of as close as we can come to sort of replicating a shelter like situation. And it's just important to know, this part of the information I'm giving is not new information. This is, you know, we've known this for almost my whole life.

Here is a newer study that was done at University of Wisconsin by Ron Schultz using the Recombitek vaccine, which is the newer, a newer vaccine, and he saw the exact same thing, where he said he wanted to know what one dose of vaccination given four hours just before being placed in a room with other dogs who were shedding a virulent virus be protected, and all of those vaccinated puppies were protected within, you know, with a single dose of vaccine given four hours before intake. So it's pretty phenomenal vaccines and great research to show how well they work. Let's move on.

So we've got this chart now, the problem with puppies and this is something that's really important for people to understand when it comes to vaccinations. We've got this great vaccine. When we give it to an adult dog, we really can expect with one vaccination that we should expect that the animals will have a great response to that vaccine within three to five days. They probably have a complete protection against canine distemper.

The problem is with puppies, puppies up to about 20 weeks of age may have maternal antibodies that interfere with that vaccination, and basically the way I like to think about this is kind of like Pac-Man. That the antibodies in their system, the antibodies came from their mom. The antibodies in their system when we give that vaccine, the antibodies see the vaccine and they kind of just gobble it up and get rid of it, and so the puppies' immune system really never has a chance to respond.

And so what's happening in this chart, and it's hard a little bit for me to explain it without pointing to things, but this top black line that you're seeing is the minimum titer to block virulent viruses. So it's the minimum level of antibodies that they puppy might have that would block real virus. So if the antibody titer is above that black line, then the puppy is not going to get sick, even if it meets real virus.

The purple line that's kind of going diagonally across the chart is just a random puppy's antibody titer. So we don't know what any particular animal's antibody titer is, but we're going to say for this, for the case of this discussion we're going to use this purple line and say this is some puppy's antibody titer.

The bottom black line is the minimum level of antibodies that would block vaccine virus. And so hopefully what you appreciate is you're looking at

the chart is that it takes fewer antibodies. You can have fewer antibodies and still block the vaccine, but you need more antibodies to be able to protect you from the virulent virus.

So let's go through an example. If we say at four weeks of age we vaccinate the pup, if we follow straight up from the four weeks of age mark here, we can see that oops, it's above the place where the vaccine would get blocked. So our vaccine isn't going to work when we gave it. It's not going to immunize the puppy.

But we can say, "Oh, that's okay, because we're also well above the antibody level where the puppy would be affected by real virus. So then we're going to re-vaccinate it at two week intervals, so we'll re-vaccinate the pup again at six weeks of age. And even here, we can see well the antibody levels are too high. The vaccine didn't get through, but again it's still okay, because even if the puppy meets real virus the antibodies that the puppy has in its system would protect it and the puppy wouldn't get sick.

If we go to eight weeks, this is where we see the problem and the problem actually starts just before eight weeks. So the problem is starting right around seven weeks, where what we see is the antibody level is dropping below the level that the puppy needs to protect it from real virus, but the antibody level remains above the level where the vaccine would make it through the maternal antibodies and allow the puppy's own immune system to respond.

And so we call this little gray box that's created there the window of susceptibility, and the problem is that we never know where that window of susceptibility is with any particular puppy. And so this is really the reason that we re-vaccinate puppies at two week intervals, because we're trying to close this window as closely as we can, and make it as small as possible.

Again, we're lucky because the vaccines that we have now give us only a two week window of susceptibility. My understanding is this window of susceptibility used to be a much larger window. So when you're vaccinating puppies, know that most of the time you're probably able to protect them. So this is not an argument to say, "Don't bother vaccinating the puppies." Because lots of time and probably most of the time when you vaccinate the puppies you are able to immunize them.

But sometimes, when you're vaccinating puppies, the vaccine that you give is not immunizing the puppy, and so you need to come back and vaccinate again. This is one of the reasons that I use the term re-

vaccination when I'm talking about vaccinating puppies, rather than using the phrase booster.

A lot of people get really confused by the concept of a booster, because they think that they needed to give one vaccine and then the next vaccine makes it more effective that they gave the last one. And even veterinarians get confused about this. I'll have people call me and say, "Oh that puppy was in the shelter for eight weeks and it got all three of its boosters, and then it still got distemper. There is something wrong with the vaccine."

And what I'm hearing when they say that is that they kept the puppy in the shelter all that time and all that time the maternal antibodies that that puppy had that were protecting it faded and went away, and the puppy's window of susceptibility opened and allowed that virus to come in. So hopefully that makes sense. If that doesn't make sense please ask questions. It's a complicated concept, but it's an important one for everyone to understand.

We want to type the vaccines. There is really just two types of vaccines for canine distemper right now. There is modified live virus product, and that's the product that we recommend for most shelters. There is also what's called a Canarypox vectored or recombinant vaccine. That's a vaccine made by Merial called Recombitek, and both vaccines again, the research I just showed you, both vaccines have been chose to be very effective at inducing immunity for canine distemper virus.

Vaccine recommendations are to give either one of those two vaccine products immediately on intake or even sooner. It means it wants you to repeat that at a two week interval for any puppies who are under 16 to 20 weeks of age. We recommend re-vaccination post adoption as a safety net, just to make sure, just in case there was anything wrong with the vaccine that was given in the shelter.

It's a great idea to recommend to a Dr. either to do it at one year of age, or any time after puppies are adopted from the shelter. We're huge fans of community vaccine clinics. There is everything you can do to induce more immunity in your community will help you to avoid outbreaks of canine distemper virus.

One really sad outbreak that I just worked on managing was in a community, where the city had not given the shelter money to pay for vaccine, and it was really interesting because in that outbreak, almost every dog in the shelter ended up infected with the virus. And so what that tells you is not only was it that the city government itself wasn't prioritizing vaccination, but the community as a whole was also not prioritizing vaccination because all of the dogs that got sick in the shelter

weren't protected by vaccinations that their owners had given them before they ended up in the shelter.

Diagnostics, move on to diagnostics. It's a collection really of clinical signs, history and then also the herd or the group history that really helps us come to understand or to start to suspect canine distemper in individual dogs, or in an individual organizations. We do diagnostic testing once we have that suspicion, and we also try to collect information about what's going on in the community.

There are definitely some communities that are more at risk of canine distemper than other communities, but also don't let that fool you. The whole time I was in vet school I heard everybody talk about how you know, we just don't really see canine distemper up here in the north, in Wisconsin, but we have had two of the worst outbreaks that I'm aware of in shelters. One was in the city of Chicago and one was in the city of Milwaukee.

Because really, anywhere where raccoons interact with dogs that are not vaccinated, there is a possibility of canine distemper being spread. So please don't sort of believe the area and in a community where you just don't see it, even though in some communities it's much less common. You really still can see canine distemper in the shelter.

It's important if you're suspicious that you might have a problem with canine distemper. So start to look and evaluate your risk factors. Things like no vaccines getting in the shelter late or postponed vaccination. One of the saddest things I see when I work on outbreak is the dogs who have got the outbreaks are always the dogs that there was some reason or another that the dog didn't get vaccinated on intake.

Either the owner said the dog was up to date on vaccine, or the dog was a little bit difficult to handle, or somebody thought that the dog was a little bit sick. So there is really almost no good reason to postpone vaccination on intake. And what I usually say is, "If you think the dog is too sick to be vaccinated, then they probably are too sick to be in the shelter."

Risk factors having lots of puppies, crowding, co-mingling in random ways. Some in, some out housing. One of the biggest risk factors we see is minimal or no isolation for respiratory disease. So shelters that are just leaving dogs in place, even though they're sick and really not responding by separating sick dogs from the general population. We see that at very commonly in shelters that are having problems with canine distemper. Dogs that need to move out of their kennels during cleaning and also transfers shelters that are accepting transfers from higher risk shelters. Let's move on.

Evaluation of clinical signs again, we want to look at illness in individuals and also look at those signs in the group. And then we always want to be kind of asking the question, if we do see illness, is this an individual animal who is sick, or could it be this is actually part of a larger outbreak? And so again, we're looking at the severity of the disease, looking at the ages of the animals that are affected. The number of animals that are affect, and kind of the timing of when the animals are affected. We'll come back and look at some timelines to look at that.

Vaccination policies and practices are really important. We rarely see significant outbreaks in shelters that are doing a great job vaccinating on intake, and not just as a policy, but as a practice. So it's not to shelters to tell us that they have a policy to vaccinate everyone on intake, but then when it really comes down to it there is a lots of dogs that are slipping through the cracks.

Huge issue when we're seeing that there is a community problem with canine distemper. Then that almost always will kind of bleed over into the shelter, so we want to be careful and try to be aware of when problems like that are arising in the community.

The kinds of diagnostic testing that we do, we most commonly rely on our rtPCR testing to look for actual infection in dogs. We have a great partnership with the Wisconsin Veterinary Diagnostic Lab for animal shelters.

If you're interested in doing diagnostic testing through the Wisconsin Veterinary Diagnostic Lab if you come through RUW Shelter Medicine Program, then you've got shelter pricing, which is about half price. And we will help you interpret the results that you get. IDEXX also has shelter pricing and does a great job with the rtPCR.

Less commonly now, some diagnostic labs will use IFA. It may be a little bit more specific, but it's definitely it can be less sensitive. Some people like to try to use serology and you'll definitely see that written in the infectious disease textbook. In our opinion with serology especially in shelter animals is best used to evaluate susceptibility or protection in the shelter setting. It's a very sensitive test, but it has limited value, because you really need to watch the change in the antibody levels over time to understand whether the dog was infected or just protected because of vaccination.

Negative tests for all of these diagnostics really don't rule out the disease. Positive tests pretty much rules it in, and negative tests if you're still strongly suspicious, we recommend that you test again just to see if it

happens to be that you got a negative that time that you were testing. Let's go to the next one.

Lots of people want to know is that positive from vaccination, and this is a big, big question that we get, especially when we're using PCR diagnostics, and even when you get your diagnostics back from the laboratory you'll often see something at the bottom of the sheet that you get. Thank you. Oh, this positive is within a level that may suggest vaccination.

And this is one of those like for me, kind of a red flag thing in the presentation, so it's something that I hope you'll really take home with you from this presentation. That if the report tells you that the dog is positive, and the viral load is low, so that's what they mean when they say, "It might be from vaccination."

Please understand that it might be from vaccination, but it also might be from early infection where we can also see a low viral load early in an infection. We see a low viral load late in an infection. We also see low viral loads because we got poor virus recovery, or poor sampling. We can also sometimes see a low viral load because of vaccine shedding.

So this is something where if you're doing the testing and you have a low viral load that's getting reported to you from your laboratory, you want to be sure that you have a veterinarian who is helping you make an assessment of whether you think the dog is a real positive or a vaccine positive. It's really becomes a clinical judgment call based on history and context, and sometimes what we'll recommend is to test again in a little while.

If it's a vaccine positive we wouldn't expect that testing a week later would still be positive, whereas if it's a real infected dog, then we would expect that that positive would remain positive. So just to be clear, there is no direct means to differentiate a vaccine virus versus a field strain with PCR alone. So when you get those reports back understand that what they're telling is just that it's a low viral load, and that there is multiple reasons that you might see a low viral load coming back on your testing.

So again, we might see vaccine interference, but we might see some vaccine virus which is the modified wide virus shedding in our samples. It's less likely to interfere with testing from swab samples than it is from blood samples. It's most likely to interfere, so we might see a vaccine positive one to three weeks post vaccination, and of course, most of the dogs in the animal shelter before vaccinating on intake are in fact one to three weeks post vaccination.

But remember that vaccine positive, at least in our experience are fairly rare. So we don't see them too often, and so a good rule of thumb is most of the time if you're getting positive PCRs back for your canine distemper testing, really take those seriously and have a high level of suspicion that the dog may have an infection. Let's move on a little bit.

We can do the CSF Antibody detection for testing for canine distemper. Again, this is not something that we're going to commonly do in shelter animals. Be very cautious if what you're experiencing in the shelter is significant neurologic disease, because again, canine distemper is not the only thing that can cause neurologic disease in dogs. There is a high risk of rabies when you're seeing neurologic disease.

When neurologic disease develops, even if it's from canine distemper, there is a prognosis that turns to poor, and we see really significant loss or concern. So for prognosis it's not that every dog is going to die if it develops neurologic disease. We do see many dogs recover, even though they develop neurologic disease, but it's a place where you want to be sure you have veterinarian involvement. You want to be sure you have supportive care being given and have veterinary supervision over the case so that the welfare of the dog remains as best it can.

One other kind of diagnostic testing obviously is looking at unique Co CQ or histopathology results from dogs who have died. It is often the best way to rule out the disease, and can help you evaluate risk to the group. So if you are worried about canine distemper and you're not C positive, and you do have a dog that dies it's a great idea to submit that dog to the laboratory for testing.

It will also help you explore other potential causes for disease if you're seeing problems, and so always look into that if you're having deaths that you think might be related.

It's a great idea when you're looking at dogs and thinking that you're having problems with canine distemper virus to really think about what the source is for the disease. Is do you believe that the dogs are coming in and they had community acquired disease, and they were infected when they got to you? Do you think that the disease is spreading within your shelter? Or is it something where the dog came from another shelter and you believe that the dog got infected at the other shelter?

The point for trying to figure this out, of course, is not just casting blame. The idea is to really figure out where you want to target your intervention for making things better and solving problems so that the problems don't continue. One of the ways that you can figure out the source is by looking at the timing for when the disease starts in the dog, and so again, I'm going

back to this chart that we made. We know the most common recognition of signs happens in that kind of week and a half to two week time until right about four weeks.

So if what you're seeing is most of your cases are developing in this timeframe, then probably the infection is happening sometime very soon after intake. If alternatively the onset of illness is within the first few days or the first week in your shelter, than it's more likely that the source is somewhere else other than your shelter, either in the community or another shelter that the dog was in.

If the onset of disease is more like five to six weeks, then it's really pretty confirmatory that it's happening within your own organization. So these are just things that will help you to try to figure out what to do in terms of intervening and how to solve the problem that the dogs are getting infected in the first place.

One thing I want to just point out again is just this concept of amplification in an animal shelter, and so if we have a dog come in who is infected, if we just had one dog in the community and not that dog is all by itself, that dog is not going to spread virus, but if we bring that dog into an animal shelter then that dog gives his virus to another dog, and then that dog can pass that illness to the other dogs in the environment.

The great thing about vaccination is that vaccination can sort of put *X*'s on all of these areas and reduce the level of amplification. So if the dogs are immune, then the infectious potential drops really rapidly, because you can't get that same kind of spider web effect or that net effect that amplification needs to dramatically change that.

These are one of the things that we can really tell in what communities in what communities owners are doing lots of vaccination, because in a community, for example the community that I live in when we do the testing on intake we see that almost all the dogs are already protected against canine distemper virus.

So if a single dog comes into the shelter infected with the virus, the virus isn't going to spread very far. Whereas in some of the other shelters that I work with in different communities, if a dog comes in with distemper the risk is much higher because the community itself is not doing a great job of vaccinating the dogs, and so many of the dogs in the shelter are still susceptible, and we saw that in this last year in several shelters. So we saw that happening.

Again, just I'm putting in a plug that random co-housing increases that risk of amplification, because you take the infected dog and directly expose

other dogs, and especially if you're doing that right at the point of intake, you're doing it before the dogs have had that opportunity to let that vaccine even get to its partial protection.

Whereas if the dog came in and was housed individually, all the dogs have time to develop immunity post-vaccine, and the dogs come out much better. Lynne, I'm going to skip to the prevention slide, if that's okay with you? You can make that work for us.

Lynne: Yes.

Dr. Newbury: Thank you very much. So vaccine is a really important piece of prevention and along with that is just eliminating all the other risk factors, as well. So vaccine on intake versus in our community outreach I think when I saw high on the list protects your puppies, but get them out quickly. So don't think that you're protecting puppies by either asking the source shelter to hold onto them longer to give them more vaccines, because that's actually not protecting them. Getting them out of the situation that's high risk is the best way of protecting puppies.

If you have double sided housing, puppies should be the ones that you're prioritizing in your double sided housing, because it's easier to protect them if you don't need to remove them every time you're cleaning. Isolate or separate sick dogs promptly. Avoid intake co-housing for dogs. Monitor closely for illness, and I can't stress that one enough, that the shelters that are recognizing that dogs are sick quite quickly, and separating those dogs from the general population are the shelters that have a great record of sort of having a sick dog come in. Recognizing it, isolating it, and we see that it doesn't spread.

Test periodically when clinical finds are indicating it. It's really, really worth it. Through our program testing for canine distemper virus costs about $20.00 to $30.00, and it is money that's incredibly well spent, because sometimes shelters will try. No, I'm going to save $20.00 or $30.00, but then the amount of money that you'll spend responding to an outbreak and the welfare of the dogs and lives that are left are not worth not having that piece of information. So please, take respiratory disease seriously.

So that's kind of what our basic foundation building blocks of understanding all the factors for canine distemper virus and how it works, and what our key sort of preventive strategies are. And now what I want to talk about is how we respond to illness.

Prevention is still really the key, so I want you to know when I say like, "Oh, we have all these great possibilities for how we can respond to this

virus." We do. It still is a significantly life threatening disease, and so in many ways we've done a lot of work with ringworm and with ringworm, we've been able to say, "We can treat this disease. It is a treatable, curable disease, and very few cats need to die, because they have ringworm."

Distemper is, there is not a treatment specifically for distemper. We can support dogs through the viral infection, and many dogs will recover. Many, many more dogs than we ever thought will recover, but it is still a horrible disease, and many dogs will not recover. And the dogs who don't recover, you know, suffer, and so we'd really want to focus on prevention. It is one of the most preventable diseases that we experience in animal shelters, and it is as simple as getting these animals vaccinated and protecting them long enough to allow their vaccine to take hold.

So again, when we're responding we want to think about individual animal illness, individual health and welfare, group health and welfare. When we're going to make a choice. What are we going to do with this animal now, who is infected? We need to think about what is the potential for spread, or for an outbreak to occur? What's the potential for this animal to get adopted? What isolation space is available? And do we have the capacity to provide the kind of treatment and supportive care that are necessary?

One of the saddest things I've seen is where shelters are really trying to do this, but they don't have veterinary support. They don't have the resources, and so the dogs are really suffering. So please, if you make a choice to try to respond by treatment, make sure you've got the support that you need to be able to do that and do that well.

What are the clinical signs, and what are the prognosis in the individual animal? And is that, is treating that animal both in that animal's best interest and in the best interest of the organization? How many other susceptible animals do you have in your population? So you kind of understand what the risk is of keeping the dog in the population. And what resources do you need?

When you're seeing an individual animal that's ill you always want to think kind of bigger picture, and do you need an outbreak response plan or is this really just an individual animal issue?

When we're thinking about responding to outbreaks, the most key concept we can think about is stopping the cycle of transmission. What we want to do like the very first thing we want to try to do is to stop putting fuel on the fire, so make sure that we're protecting susceptible dogs from whatever else is going on.

The problems, and I think about this. I often do an exercise where I have people work through an outbreak by kind of saying, "Here are the problems. Here are the rules. You need to make strategy surrounding these." And one of the things we see is that there is a very long incubation period. Remember, there is that six week incubation period. There is ease of transmission from one dog to the other. The clinical signs, as I told you, often overlap with just canine infectious respiratory disease, so what we think of as kennel cough dogs.

We can have reservoir dogs, because of that. So we can have a dog that just was mildly ill, and then recovered that that dog is still in its kennel putting out enormous amounts of virus into the environment, and if that dog is interacting with other dogs can be a reservoir for infection.

Some puppies are going to be susceptible to the virus, and we don't know which ones. It can have a very long recovery period, even though often the dog's clinical signs will recover well before they test PCR negative. Some dogs won't. Some dogs will go PCR negative quite quickly, but in some cases we have these long recovery dogs. And again, resources. All the diagnostic testing that's needed, and all of the resources for treatment, and care, and the kinds of care that will keep your healthy dogs healthy and your sick dogs well taken care of.

But the strategies that we use primarily are referred to as a clean break, and the idea behind a clean break is keeping the new intakes and the healthy dogs away from the dogs who are sick, or the dogs who have been exposed and are still at risk.

The reason that I say here please don't do nothing, is that I feel that there are many shelters that get very overwhelmed by even thinking about canine distemper virus, and so they don't actually respond. And I guess what I want to tell you is there is lots of help out there, and Maddie's Fund and the ASPCA have been working really closely with our program in particular to help shelters get help for diagnostic testing.

So if you feel like you might be having a problem, we really want to stress to you to please don't go this alone. Reach out for assistance. We can't promise you in advance that there will be funding and assistance for you for diagnostic testing, but in most cases we are able to find assistance for you to help fund the diagnostic testing that you need to get out of the outbreak.

What we found is by investing that kind of funding in diagnostic testing for the outbreaks that again, we're coming out of these outbreaks really maximizing the lifesaving with only small handfuls of animals that are lost, and that is a really different picture than what we used to see when

we managed outbreaks, where often de-population was the sort of chosen path by many organizations because it was too overwhelming and too resource intensive.

So get veterinary assistance. Our program is often available to help with that. Some of the other shelter medicine programs are also available to help. Try to find a veterinarian who can help you locally. That's the best scenario possible.

If you think you're having a problem with disease, communication in your community is incredibly important. We recommend that you communicate early and often. Ask your community for help, and explain the lifesaving work that you're doing. Wisconsin Humane Society is for me, kind of the banner example of that. When they had an outbreak about five years ago they reached out to the community.

They explained what was happening, and they asked for help. And the outpouring of help was just phenomenal and it was such a huge difference from what I've seen in the past where shelters are getting attacked because of their outbreaks that they were having. Wisconsin Humane has made the press information that they put out available and several other shelters have used it when they were having distemper outbreaks. It has worked equally well.

And so I encourage you to not sort of hold this information on your own. Make sure you let your community know what's happening. What you're doing, that you're getting help, and how you're approaching the situation and that you're hoping for as many lifesaving outcomes as you can muster.

Understanding risk assessment and immunity is a really key feature of being able to respond. And so I'm going to walk us through kind of how do we do this? Well what we try to do is we try to categorize all of the dogs into risk groups. So we designate very different risk groups, and we base this idea of designating risk groups on controlled challenge studies that have been done over many years. None of those studies are studies that I have done. Many of them are studies that Ron Schultz or other researchers have done. And so we have an idea of what kinds of immunity are needed for the dogs to be protected from disease. So let's go on.

Risk group evaluation and clean break is kind of what we're talking about when we're talking about a response. In general principles of this are to stop the cycle of transmission. Send low risk dogs – first we have to identify which dogs are low risk, and we're going to send them on their way. Then we're going to isolate or separate any dogs that are sick, so first again we need to identify those dogs and then isolate or separate. And then we're going to identify which dogs are susceptible. Let's go on.

Here is kind of an overview of what we're talking about, and so if we imagine this clean break and we take this big vertical red line, we're going to take any new incoming dogs and we're going to keep them completely separated from the population that's already in the shelter. And so we're going to look at all the dogs that are already in the shelter and evaluate them for clinical signs. This is a great time to get a veterinarian involved to come in and really tell you which dogs have clinical signs of disease, and which ones don't.

Any dog that doesn't have clinical signs of disease we'll collect blood to do an antibody titer. We don't run antibody titers on the dogs that are sick, because if the dog has a positive antibody titer, we can't tell whether that dog is protected or infected. They could have a positive antibody titer from either of those things.

What we know from all the research that we've done though is that if the dog has no clinical signs of disease and a positive titer, then the dog is very low risk. We don't ever say no risk, because biology just isn't perfect in that way, but in general what we found is that when we see dogs who have no clinical signs and they have a positive antibody titer, that those are dogs that are very, very unlikely to go on and become ill.

And so what we can do is we can look at those antibody titers and in most shelters, especially shelters that are vaccinating on intake, the majority of dogs will fall into that category, and so this has been over the years a huge kind of positive thing that we've discovered that most of the dogs are usually protected. And so there is a huge group of dogs that we can say, "Go ahead and just get these dogs adopted." Or, "Go ahead and transfer these dogs out, because they have a positive antibody titer. They're not going to become ill."

In some cases some of the transfer groups had asked to also PCR test some of those dogs, and the good thing about doing that is if they have a negative PCR and a positive antibody titer, then we can be almost certain that that dog is not sick and not going to become sick. If the antibody titer is negative, then they fall into the higher risk group. Again, it doesn't mean that they're infected, but it means they were susceptible at the time that they might have been exposed.

So now I'm going to just kind of walk us through in a step way fashion how we would do this response. So we hopefully, we're vaccinating on intake, our center. We're repeating at two week intervals if puppies are staying that long. Getting them out soon, as soon as we possibly can. We're evaluating the potential for adoption and all of these guys are

considering every dog in our current population and we're evaluating our capacity to provide care for the dogs.

We're going to implement a clean break, so we're going to take new incoming dogs, separate them from all the exposed dogs. We're going to clean and disinfect whatever area we're setting up as our clean break area before we move dogs into it. Again, this is a relatively easy virus to kill, so you don't need to leave it empty for a number of days. You just need to clean and disinfect the area, and then you can use that as your clean break area.

You're going to be evaluating your expected intake to help you figure out how many kennels and how much housing do you need in your clean break area. If you're having a significant problem you may even want to think about slowing or stopping your intake. We've worked with several municipal shelters, who have done a great job communicating to the public in just saying, "Hey, we're not going to take owner surrenders for a little while. Can you just hold onto your dogs? It's better for your dog not to come into this population while illness is in the population."

Again, any comingling that needs to be done because of cage space requirements, you want to plan that out carefully and not have that be random mixing. And then always clean and care for the new arrivals before you're handling or caring for the dogs that are exposed or ill. And if it's at all possible you even want to have separate staff, so that you don't have any of that fomite transmission. Go to the next slide.

So the next step would be to go through, evaluate all the dogs for clinical signs and say you want to very, very carefully look at each dog. Any suspect clinical signs would put that dog into the high risk category for respiratory disease. Any kind of unexplained GI disease, we call it ain't doing right if we see depressed dogs, dogs that aren't eating. We can do PCR testing on these dogs that have clinical signs, but remember, even a negative test doesn't necessarily mean that the dog isn't infected or that it's just it can also be just a point in time.

So it might mean that the dog wasn't shedding today, but it might be shedding a different day. So that's why we always put dogs who have clinical signs of illness into that high risk category, if we're working on an outbreak response. Sometimes if we're trying to decide if we're actually having an outbreak, then the PCR diagnostic testing can help us figure out whether the sick dogs are actually distemper infected, or whether they actually just have some other kind of more moderate respiratory disease.

Step three is to look at antibody titers, and again we're going to look, try to differentiate the dogs into high risk and low risk groups by using their

antibody levels. Remember that we can't evaluate dogs with clinical signs. We can evaluate puppies, and that's a question that a lot of people have. When we do evaluate them a puppy with an antibody titer that's positive, we can't necessarily say whether the antibodies that are there are maternal antibodies, or antibodies from active immunity that the puppy has developed on their own.

But in any case if they're at a level that's protected, we consider them to be protected. At the same time, we know that maternal antibodies degrade over time, so if there is a pup that has maternal antibodies now, we want to get that pup moving and get them out of the shelter, because we know those antibodies might drop and that window of susceptibility might open.

There is in-house kits you can use for evaluating antibody tests, both canine VacciCheck and Synbiotics TiterChek are tests that can be run in-house. You do need to have fairly experienced technicians or people that are really good at following directions to run them. The cost ends up being approximately $20.00 per dog. You can also send these into the lab and the lab can run these tests for you, as well.

Antibody test interpretation, remember positive is a good thing. A positive test for antibodies in an adult dog with no clinical signs indicates low risk. Low risk doesn't mean no risk, but it does mean that it's very unlikely the dogs will get sick. So we talked about the puppies. Let's move onto step four.

We want to evaluate the risk. So if we're looking at dogs that we're saying, "Oh this dog is high risk." Then we really want to say, "Well how high is the risk? What are the vaccine practices of the shelter? Were most of the dogs vaccinated on intake?" The canine distemper titer, it's a little bit ironic, because the vaccine has been shown to work so quickly to provide partial protection, but it does take a fair amount of time for the antibody protection to be detectable by the lab tests that we currently have available.

So if we know that the animals are being vaccinated on intake, even if we see low antibody levels, we often will hope that the animal is a little bit less high risk than an animal that wasn't vaccinated at all.

What kind of sanitation practices does the shelter have? Are they comingling? And so we can sort of take all of these factors and put them into this understanding of how we evaluate risk. Let's go on to the next.

The next one, step five, is a shuffle and basically what we're doing is, we're taking the dogs that we have identified as being low risk and having them be in one area. Any of the dogs we have identified as high risk, who

need some kind of quarantine, again usually this ends up being a small number of dogs. So sometimes we can get them out to foster care. Sometimes we can get them into different places, and then the sick dogs all need to be isolated and separated away from the general population. Let's go on.

Well for dogs who have clinical signs, again we want to remove or isolate them. We want to carefully lay the risk of keeping sick dogs in the shelter. Some, we want to think about. Can you care for them? How long are they going to need to stay there? And ideally, we're going to want to get two negative tests before those dogs are released to the general population.

For low risk dogs, so dogs that had a positive titer, those dogs we're going to send home. We're going to inform potential adopters about what was going on in the shelter, but let them know or potential transfer groups that we really don't believe that there is much risk for these dogs. They, if ideally we would keep them separate from the clean population, but if we can't, these are the dogs to put with the other dogs that are the new intake, because these are the dogs that are very, very unlikely to become ill.

High risk dogs, again, we want to think about all these problems that we have, and try to come up with a good solution for these dogs. In many cases we need to quarantine them, and again, what we find is that these are usually a smaller group of dogs. We used to say that these dogs needed to be quarantined for six weeks.

But what we have discovered is that if we watch these dogs over time, and they don't develop any clinical signs, we can repeat the antibody testing along with a PCR and if they have no clinical signs, they develop a positive antibody titer and have a negative PCR. Then they move into the lowest category and can go on their way. And that usually happens much sooner than six week of time. So again, it's a way that we can get the dogs moving through the shelter a little bit quicker.

People ask a lot of time – let's move on to the next slide – can you safely send them somewhere else? You really want to prioritize probably the healthy high risk dogs to go. Some shelters can find foster parents for the sick animals, especially for the mildly ill animals, but just remember to really carefully think through what is safe?

We only want the dogs to go with well vaccinated adult dogs. We want them to go with resilient humans because the dogs can deteriorate pretty dramatically, and so we want people to be informed of what might happen. We definitely don't want to send sick, or infectious, or high risk dogs into homes where there are puppies. And we don't want to send them to uninformed adopters.

I think one of the hardest things for me to think about is depopulation. When I first started working with shelters a long time ago, it was one of the things that was the most heartbreaking thing that I saw, that many shelters, if they had even a single case of distemper, would depopulate their shelter.

What we know now from all the work that we've done is that really isn't necessary, and there is a lot of loss of life of dogs who never were really even at risk at all, when that happened. So we hope you will do a risk assessment, rather than depopulation. We hope you'll reach out for help, because when you get that help you can do the risk assessment, and again we find that that's a really lifesaving endeavor.

We hope that whenever shelters are working through problems like this that in the end you will develop a long-term response plan. And what I've seen is that I've been so proud of the shelters that I've worked with because many of them – almost all of them after experiencing problems with canine distemper in their shelter really go on to eliminate those risk factors.

They really take that opportunity to affect change in their organization and almost every shelter that I've worked with through one of these outbreaks has really found inspiration in working through that to really change a lot of underlying factors that allow the outbreak to happen in the first place. And have even seen whole communities kind of rally around that, and it's that in itself has been really, really inspirational.

So on our summary slide here, just go back, it's a lot of information in the last hour, almost and a half. It's one of the most preventable infectious diseases we've got, although there is again, it's something as simple as a very inexpensive vaccine can protect a dog for life, and really be all the difference in that dog's life.

Let's all see what we can do to have work towards community solutions that help develop immunity within the community, so that when dogs come to the shelter they're already protected from canine distemper. Don't wait for an outbreak to put good practices in place. I'm proud of all my shelters that have put those good practices in place following an outbreak, but what I really hope is that you'll get inspired before you ever have an outbreak, so that you don't ever have to call and get help from us.

And then please remember, outbreaks can be managed in incredibly lifesaving ways. We want to help when that's happening, and we want you to get help when things like that are happening. So please reach out for help if you feel like you're having concerns with that.

With that we can go to some questions, but I will also wanted to say thanks to you guys every day for the work that you do. This is a picture of one of my shelter dogs and this is the same dog I was showing you before, and just how happy I am that a shelter did the right thing for him and I think about that all the time for all of you doing the right thing for all of the animals that you're taking care of.

Lynne: Thank you so much Dr. Newbury.

Dr. Newbury: So what questions do we have?

Lynne: We do have several questions for you. Here is our first question. What two negative tests are needed for shedding period PCR?

Dr. Newbury: So what we look at to determine that a dog is no longer infectious, what we look for normally is a PCR test and –

Lynne: I think we lost Dr. Newbury. Hello. We may be having some difficulties here.

Jessica: It looks like we did lose Dr. Newbury, Lynne.

Lynne: Yeah. I have to apologize, Dr. Newbury, in her area where she lives up in the northeast or northwest, actually the Midwest, I believe, they had severe storms tonight and she's been working from her printed slides with no power, and her cell phone.

So I think we're going to have to just get these questions answered in a document from Dr. Newbury, and then we'll post them on our website, so that you can get your questions answered. And then we'll probably just go on ahead and close for the night. Jessie, do you want to give the audience your closing remarks, and we appreciate you all attending tonight.

Jessica: Sure thing, Lynne. So that looks like that will be the end of our event tonight. Thank you everyone for being here tonight. As a quick reminder, the race approved certificate for veterinary professionals will only be given out for those who are attending the five event. The race approved certificate is not available for people viewing this presentation on demand. Be sure to join us on September 1st for our next webcast.

Dr. Newbury: I'm back.

Jessica: Oh, hello. Hi Dr. Newbury.

Dr. Newbury: Sorry about that.

Lynne: Dr. Newbury, you're back. We were just closing for the evening. Let's go to the next question.

Jessica: Great. So our next question is going to be what kind of community support did the community provide to the HS in Wisconsin? Where can we find those press materials?

Dr. Newbury: I can give those press materials to Maddie's Fund, and that in turn make them available. I think that's possible, yes Lynne and Jessie?

Lynne: Yes.

Jessica: Yes, that should be possible.

Dr. Newbury: Great. So we can make those available, and the kind of support they got was financial donations, donations of materials. They got support from local veterinarians and all sorts of things like that, so it was really fantastic.

Jessica: Great. We're going to move on to the next question now. We currently give shots starting at six weeks of age, and then every three weeks for three to four rounds. Are you saying we should be doing a shot at weeks 4 point 6, 8, 10, 12, 14 and 16?

Dr. Newbury: That is a great question. So what I'm saying is that the inset, and I am saying this and it's not just me who is saying this. There is the recommendations from the American Animal Hospital Association Vaccine Guidelines. They now have recommendations specifically for animal shelters and the recommendation is to start vaccination at four weeks of age. And then to give a vaccine every two weeks while the pup remains in the shelter.

So what my hope would be is that you would never have a pup that remained in the shelter long enough to give it a second vaccine. I know that's probably not – that's probably too optimistic for many shelters, but again, so we would if we had a puppy that came in at four weeks of age we would give a vaccine at four weeks of age. We would give a vaccine at six weeks of age.

And then hopefully that pup would be gone by the time we needed to give it another vaccine. If the pup still remained in the shelter we would give another vaccine at eight weeks of age. Do we want to give the vaccines 2 weeks until the pup is older than 20 weeks of age? So what we really, really want to do is get those pups out of the shelter quite quickly, so we

never want to hold onto the pups and keep it in the shelter in order to give it more vaccine.

Jessica: Thank you so much, Dr. Newbury. It looks like we do have time for just one more question. Is it reasonable to revaccinate old adult dogs one time at two weeks in high risk shelters?

Dr. Newbury: That is a reasonable thing to do. You can do that. You can also, you know, you can also give – when you're giving the revaccination at two weeks, just be clear that what you're really doing is giving that second vaccine for the distemper component at least, you're giving that vaccine mostly as a safety net.

And the safety net in case there was something wrong with the vaccine. The vaccine got mixed up and left out, or it was too hot, or someone gave the vaccine in the fur instead of under the skin, and so we really can expect a lot from these modified live vaccines, but it certainly doesn't hurt anything but your resources to give a second vaccine.

Jessica: Thank you again, Dr. Newbury. And I think that was that we've reached our time limit, so that will be the end of our event tonight. Again, we want to thank Dr. Newbury and all of you for your time tonight. Be sure to join us on September 1st for our next webcast, *Fostering, Saving More Dogs with Behavioral Challenges* with Kristin Auerbach.

More information on this webcast will be arriving in your inbox soon. This webcast will be available on demand shortly, and we hope you will share this presentation on your social sites. Thanks again for being here with us this evening, and good night.

Dr. Newbury: Good night everybody.

Lynne: Good night.

[End of Audio]