



Maddie's Institute

## **Evolving Strategies for Treating and Preventing Parvo in Shelter Dogs Webcast Transcript**

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*Lynne Fridley:*

Good evening, everyone. I'm Lynne Fridley, Program Coordinator for Maddie's Institute<sup>SM</sup>. We are very happy that you're able to join us tonight. Tonight's webcast, *Evolving Strategies for Treating and Preventing Parvo*, is being presented by Dr. Sandra Newbury of the Koret Shelter Medicine Program at UC Davis. Dr. Newbury served for six years on the Board of the Association of Shelter Veterinarians and continues to serve as the Chair of the Shelter Standards Taskforce. She is also on the Board of Directors for Shelter Animals Count, a national shelter database project.

Dr. Newbury is an Adjunct Assistant Professor of Shelter Medicine in the Department of Pathobiology at the University of Wisconsin Madison School of Veterinary Medicine.

We'll be starting in just a few moments, but before we do, we have some housekeeping items to go over. First, we'll be drawing ten names of those of you attending tonight's webcast. The lucky winners will receive a copy of Maddie's<sup>®</sup> Shelter Infection Control Manual. We will notify the winners via email, so good luck.

Next, please take a look at the left-hand side of your screen where you'll see a Q&A window. That's where you can ask questions during the presentation. Dr. Newbury will answer questions throughout the presentation, so please don't hold your questions until the end. Feel free to ask them at any time. This webcast will run a full 90 minutes and may go over time, but it's good information, so please stay with us.

If you need help with your connection during the webcast, you can click on the help icon, which is at the bottom of your screen. Along with the help button, you'll also see other little images. These are widgets that will take you to additional resources that Dr. Newbury and Maddie's Institute want to share with you. Please be sure to check them out.

Before I turn things over to Dr. Newbury, I want to say a few words about Maddie's Fund<sup>®</sup>. We are the nation's leading funder of shelter medicine education, and it is our goal to help save the lives of all of our nation's healthy and treatable shelter dogs and cats.

The inspiration for that goal was a little dog named Maddie who shared her unconditional love with Dave and Cheryl Duffield. They promised her that they would honor that love by founding Maddie's Fund and helping make this country a safe and loving place for all of her kind. Please use what you learn here tonight to make the dream she inspired a reality.

Dr. Newbury, thank you for being here with us.

*Dr. Newbury:*

Thanks, Lynne. It's great to be here. And I'm happy to be talking about Parvovirus today. All right. I'm trying to get the slide up here. So I'm happy to talk about parvovirus with everybody today. I'm happy everybody was able to make our rebroadcast.

Parvovirus is one of those diseases that we think about. When I was in vet school, I remember a veterinarian in vet school talking to me about how parvovirus isn't too much of a problem anymore. And I think about that every time I go to speak about it because I really think that, "Gosh, that's really not true if we think about life in shelters." And so I pulled – these are just a bunch of different news clippings from places where we see that outbreaks are still way too common all over the country.

And so there's lots of shelters that see a little bit of parvo. There's some shelters that see occasional outbreaks. And what I wanted to do is actually just start out by asking all of you, so I can get a sense of where you are, and hopefully, you all can really get a sense of what's the range that we're seeing when we see parvo in shelters? And so here's our first poll.

*Lynne Fridley:*

“How often do you see parvovirus?” Rarely, frequent individual cases, occasional outbreaks, frequent outbreaks, I'm not sure, we don't test for it, or not applicable? Please answer on the screen and not in your Q&A box. Answer on the screen where this question, this poll question appears. Click the appropriate answer. “How often do you see parvovirus?” And we're going to take a quick look at our results here. Oh, that's interesting, Dr. Newbury.

*Dr. Newbury:*

I'm not seeing the results.

*Lynne Fridley:*

Well, we have rarely, which is nineteen percent. Frequent individual cases is twenty-four percent. Occasional outbreaks is 29 percent. Frequent outbreaks is ten percent. So occasional outbreaks seems to be the leader here.

*Dr. Newbury:*

And that's – what I love to hear the most, either rarely or just individual cases, but what I expected we would hear is that there are occasional outbreaks. And not surprised that many of you are reporting that. Now, here, sorry. Now I'm seeing the results. So that's great. And rarely is – that's my happy place, and I'm really hoping that you guys can get to where either you're going to be in that rarely category or in that frequent individual case category.

And what I'm hoping we can do is – through the tools you're going to get today, you're going to learn how to manage the virus and manage kind of everyday life so that everything you do is kind of preventative for parvo. And also how to manage it if something goes wrong because something – things go wrong sometimes in shelters, and we want to be able to have the tools for how we handle that.

So I'm going to start out with just a little bit of a history. And what we're going to do today is kind of go through some of the basics of parvo in kind of the first half of the presentation. And then in the second half of the presentation, we're going to really get into really the kind of nuts and bolts, which you need the basics in order to kind of understand the nuts and bolts of, "How do we respond? And what do we do?"

The first thing, I always like to start here, because this is kind of mindboggling to me, that really, 1978, 1970 was the time when canine parvo was first reported. And the worldwide spread was very, very rapid. And I think it's [*inaudible*] to take a few minutes, even though it's kind of a scary couple of minutes, and think about what that must have been like working in shelters and at that time. And maybe some of you were working in shelters at that time when all of a sudden here is this new, unknown, very deadly virus that moved in.

And what was really incredible and the reason that I like to talk about this so much is that there was an unbelievable collaborative research effort that took place and effective vaccines were developed very quickly, which slowed the spread. And that is such an incredible model, I think, for us to look at from a research perspective that we could respond in such a great way.

And parvo vaccines we'll talk about in more depth, but they do, they really still represent some of the best vaccines we have available to us. And thank goodness because it's a really – can be a really scary disease. So just the kind of basics of parvo 101. I always use this cartoon because it kind of reminds me of, again, when I was in vet school and they'd talk about this virus and all the particular little things about, "Well, why do I care that it's a double standard DNA virus?" Well, the reason that you

care is that parvovirus – that means that parvovirus is really good at reproducing itself. It doesn't make very many mistakes.

And so it's what we call antigenically stable. It doesn't mutate very much or very often, so even though you'll hear and we'll talk about it tonight – you'll hear about various strains of parvovirus, what you need to be sure you understand when you hear about those strains is that they're not very much different genetically than whatever strain came before them. And we'll talk about why that matters so much, but I'll give you a little preview, which is that all the tests and the vaccines and all of that will continue to work when something is so close genetically. So that's also really good news.

The bad news about parvo as a virus, sort of physically how it is, is that it doesn't need an envelope to survive. It doesn't have an envelope. The bad news about that is that envelopes are easy to get rid of, and so a virus that needs an envelope is usually easier to kill than a virus that doesn't need an envelope. And so parvo falls into that category.

And in fact, parvo kind of becomes our litmus test or our high watermark for disinfection and things like that because it is so hard to kill. So what we usually are recommending when we are talking about a disinfection plan is if it's good enough for parvo, it'll be good enough for pretty much everything else. On the other hand, if it isn't good enough for parvo, you'll probably end up with parvo in your environment because it's so hard to get rid of. So we'll talk about that again as we go forward.

So let's just kind of preview now what's happening with tools for management. But the big ones that we're going to talk about today are recognition. And I don't want to minimize that all. That just being able to see parvo when it's there and doing the testing and knowing that an animal has parvo is one of the most important steps in managing the disease. Vaccination gets the gold star. It's just – I can't even – really, I can't even imagine a world without *[laughs]* – a world in shelters without vaccinations for parvo would just be horrifying.

This infection risk assessment and quarantine and treatment. And we'll talk about all of these today – tonight. I'm going to start by talking about transmission. And I know some of you actually already made it this far when we started doing this presentation, but when we say, "What's wrong with this picture?" really look at this picture and think about, "Well, what is wrong? It looks like she's really putting in a great effort. She's got an apron, she's got gloves, she's got a scrub top." The thing to know about transmission with parvovirus is *[that]* it is shed in feces and vomit, so in bodily fluids. It's very easily spread by fomites. That means anything that

can pick it up and carry it from one place to the other. And here's our little list of things that might do that.

So think about when there are times where what you're really trying to do – what you really need to do is protect, think about using longer gloves because those gloves, if we think about that picture, left much of her arm bare. And so there are times when you really want protection. Think about – these are just exam gloves, actually, for bovine. Think about using a longer glove or think about using gowns that are disposable that cover your arms. So it's important to really think about where animals are contacting because that's places that the virus could be deposited.

This is a picture from a shelter I was in, and I was so sad when I took this picture that I was the first person who noticed how sick this puppy was. And I think this puppy, to me, is kind of the epitome of whenever I think about parvo recognition; this is the picture that I think of because I think, "How important is it?" It's important from an infectious disease control standpoint, but understanding what the clinical signs of parvo are is also just unbelievably important from a welfare perspective as well. That dogs get very sick, they can get sick very quickly, and we need to respond. We need to give them the care that they need.

So from an infectious disease standpoint, incredibly crucial because the longer they go on being sick and shedding virus without anybody being aware of it into the environment, the more potential confusion there is. And then from a welfare perspective, it's really important too. So vomiting and diarrhea, hopefully, is what you think of when you think of parvo. It's not always severe, it's not always caused by parvo. So those are really, really important things.

It is possible to have very mild signs or even a dog that's infected, but doesn't really show clinical signs. And what we found is that most of the time that's not too important. It's really the ones that are showing clinical signs of disease that we need to worry about the most, most of the time.

So who gets it? The dogs who get it are – people think, again, puppies. And again, once when I was in veterinary school, I remember my instructor teaching us that only puppies got parvo, and I was kind of frantically waving my hand. "Not in my world. Not in my world" because the truth is any susceptible dog. So any dog who hasn't been vaccinated and any dog who hasn't had previous exposure can get parvo.

Parvo tends to – it likes to affect rapidly-dividing cells. So the reason that we see more clinical disease in younger animals is that younger animals have more rapidly-dividing cells because that's what cells do when you grow. And so we need to be aware that that's what happens. So an adult

dog may be infected, but actually may not have the same clinical signs than a very young dog, but it's very important to recognize that older dogs, adult dogs can get sick as well. They have some protection from age from development of severe clinical signs, but adult dogs – I'm sure many of you have seen, really sadly, that many adult dogs can also develop very, very severe clinical signs and can die from infection with parvovirus.

The way the disease behaves normally, the incubation period is about three to fourteen days. So that means from the time that they are infected to the time that you first see clinical signs. And this can be helpful if you're trying to figure out, "Well, where did this virus come from?" And we'll talk about that again kind of throughout the evening tonight.

Usually, they start shedding about two to three days before clinical signs, and that becomes very important when we go – when we talk about testing. So let's try and remember that. I'll remind you when we get to talking about the diagnostic testing. And some dogs shed for a couple of weeks after recovery. Not all. And we can use our testing to really see who is still shedding once they're recovered.

There isn't such a thing as a carrier for parvo. So either they get it, they get infected, they work their way through it and they live and the great news is then they're probably protected for the rest of their life from ever getting it again or they don't make it, which is, obviously, also a really sad reality. But there's no dog that's going to carry parvo and be infectious to others for the rest of their life. That's good to know.

As I said, the genotypes are shifting a little bit, and we see what we call kind of different strains of parvo out there, and I included this chart, I know it's a little bit complicated, just to let you know, how that is experienced. And the newest strain or parvovirus is a parvo 2C is what we call it. And many shelters have been contacting us to say, "Oh, we're having some C outbreaks. It must be 2C and the vaccines are protective and that's the problem." And I knew from some research I'll show you later that vaccines did protect against 2C and that shelters had outbreaks and it didn't have to be 2C.

And so I collected a lot of samples from one shelter that was having an outbreak, thinking I'd be so smart and I could prove that parvo 2B was still causing lots of problems. And so you can see my results here, that every dog that was affected in this particular outbreak was affected with 2C. And so I didn't get to prove what I wanted at all. But it is important to sort of see that 2C is – has become just equally prevalent and in some cases even more prevalent in the US as 2B, which was the old strain, but not a super big deal because the tests are also good for it, the vaccines are also good for it, and we'll show you that in a few minutes.

But it is a big deal because the onset of disease with 2C is a little bit more rapid and can be a little more startling. So what we see with 2C is a shorter incubation period, in general, not always, and more severe clinical signs early on than we saw with 2B. So that's, again, not from a research perspective, but that's more kind of just what anecdotally is being reported.

Understanding this concept of “dose effect” is a really important thing to understand with parvovirus because, as I said, it's so hard to get out of the environment once it's in the environment. And so I'd like to kind of include this early on in the conversation that if we're down here at the bottom of this little graph of – imagine these are virus particles. We can imagine that just little hints of parvo may not be enough to actually infect an animal or to really truly cause an environment to be contaminated. At a certain point, though, we reach what we call a threshold for infection. If we keep kind of climbing up the little graphic, we get to a point where it's much more likely that there'll be systemic spread and that infection becomes almost inevitable.

When the – as the dose effect increases, we sometimes will see a shorter time to onset and we'll see less of a chance for the vaccine to protect. And we'll also sometimes even see more severe disease. So that's important to understand in the direction that I'm describing it. It's even more important to understand in the other direction because as shelters, it's very difficult for us to be perfect, but we can be pretty good [*Laughs*]. And so from a sanitation perspective, what I'm getting at here with the dose effect and even from a management perspective, that what I'm hoping you'll get out of this is that in the end, you don't need to be perfect, but you need to reduce the dose.

I think there's probably not very many shelters anywhere where you couldn't find some parvovirus, but the shelters that can reduce the dose and reduce the dose are going to have less exposure, less dose to expose the animals to and so we're going to see more happy, healthy dogs in the environment. We're going to move on to –

*Lynne Fridley:* We have a couple of questions.

*Dr. Newbury:* Yeah, I was just going to ask for questions. Perfect.

*Lynne Fridley:* Yes. We have a couple questions, Dr. Newbury. And here's the first one. I'm going to push it to the slide so everybody can see it. "We have a puppy that was vaccinated three times and two days ago he passed away with parvo. He was six months old. How could this happen?"

*Dr. Newbury:* I'm going to hold that one because we're going to talk about it, and I'm going to – but I'm going to come back to it. We're talking exactly about that in just a couple of minutes.

*Lynne Fridley:* Okay. Great.

*Dr. Newbury:* And that is such a great question and it so perfectly sets us up for talking about vaccinations and immunity because we get that question so often. So I will address that directly in about four slides.

*Lynne Fridley:* Okay. Great. Here's one more question. "Do you allow puppies outside at a shelter at all anywhere in the grass?"

*Dr. Newbury:* I absolutely do, and we're going to get to that one too. So I'm going to hold onto that one. Sorry about that. But yes, absolutely, but we'll talk about what the reasons are.

*Lynne Fridley:* And just one more before we move on here. "I was always taught that black and tan dogs such as Rottweilers and German Shepherds are more – seem to be more susceptible to parvo. What is your opinion on this?"

*Dr. Newbury:* Yeah, that's a great question. And what that question is about is what we call non-responders. So there are very, very rare dogs who are unable – their immune system is actually unable to respond to parvovirus. So even when they get infected, their antibodies don't respond to the virus. So they don't actually create antibodies against the virus at all. And so those dogs will die if they're infected with parvovirus.

And there is some information out there to suggest that some black and tan dogs are more likely to be non-responders than other dogs, but here's the thing. Non-responders are so rare. They are like a drop in the ocean kind of rare. We don't see them very often. So even though, yes, it may be that some black and tan dogs are more likely to be those non-responders, every black and tan dog that I've seen that got parvovirus [inaudible] immune response to the virus and probably just wasn't vaccinated and that's why they got infected.

We see – in many shelters that I work with, we see, again, also a predilection that pitties end up getting parvo more than others, and so people say, "Oh, they're more susceptible." But what we think really is going on is much more that they're just less likely to be effectively immunized through vaccination than other dogs are and so – and they are overrepresented in some shelters and so we tend to think, "Oh, well, they're more susceptible to it." Hopefully, that answers the questions. Again, I really – we hear the conversation about those non-responders really commonly, and I hope that people will understand they're so rare.

And so we really want to, like, most of the time assume that the dog does have the capability to respond to parvovirus and probably just wasn't vaccinated.

So now we're going to go into kind of the section on vaccination, and I want to start out with, as I kind of hinted at earlier with my gold stars, that there's some really great news about vaccination, which is – this is not headline news from 1983 that we could find that dogs that were vaccinated with a modified live vaccine, and that's all the vaccines right now for parvovirus are modified live, that they develop a high titer within four days of inoculation. So what we say now is usually about three to five days that the dog will be reasonably protected for parvo.

The bad news about it is it isn't absolutely immediate. So we do need to protect them, but it's pretty darn quick, and that is the reason that this is actually one of our most important management tools. This is a great vaccine.

One thing to be aware of is that susceptibility to this disease varies dramatically by community and varies, again, dramatically sometimes even by organization within a single community. And what this image is showing is this is – we did a little study where we were drawing blood from dogs as they were coming into a shelter so that we could look and see how many of them were already protected probably from vaccination. And what we found – we did this in cats as well, and what we found is in some communities, it looked like this for almost every dog, already had an antibody protection against that virus.

Whereas in other communities, we would see it could go as low as 25 or 30 percent of the dogs were protected and the others were most likely susceptible. And so this is disturbing news. But on the other hand, I see it as a real positive because what it tells me is we can get out there and help and encourage people to vaccinate their animals because those animals who come in with a high antibody titer for parvovirus, they're not going to get parvovirus in your shelter. And so everything you can do to do that kind of prevention out in the community is really going to help with what's happening in the shelter as well.

So this is just a study that I wanted to show you guys, and this is addressing kind of the question of, "What happens with these different strains?" And this is a study that was done by Ron Schultz at University of Wisconsin. I think he's talked about this on Maddie's Institute before even. And so what he's showing here is that what they did is they vaccinated dogs with all the – with the current vaccines. And the current vaccines all contain *[inaudible]* canine parvovirus 2C, but then we may

challenge the dog using 2C, and you can see right here these three were all 2C challenges, all of the dogs were 100 percent protected.

So there are people out there who are saying things like, "Oh, you should all be terrified because the vaccines don't protect against parvo 2C and that's why you're seeing outbreaks." And that just doesn't seem to be the case. And what – the reason that that's really important for me is that I don't want people to abandon the vaccines thinking, "Oh, this isn't going to work anyway because we're going to see 2C."

And I'll come back around to that outbreak I was talking to you about that was all 2C, and I'll show you how all the dogs in that shelter were actually protected against the virus and that it wasn't really a shelter outbreak at all. So hopefully, you – that'll help you remember that.

Vaccination for parvo, as I said, we use a modified live virus. It works in most dogs within three to five days and without a booster. And that's one of the things I'll talk about when I'm talking about puppies. But people often use that word booster. That word is actually left over from when we used to use *[inaudible]* vaccine products. So we do recommend re-vaccination and we'll talk about that. With the modified live vaccine, when you give the vaccine, in most cases, that vaccine either immunizes or it's blocked in some way, but we never really give a booster, and I'll talk about that again as I'm going to show you about how things work in puppies.

We can give a modified live vaccine for parvo in puppies down to about four weeks of age. And the reason that we talk about re-vaccination for puppies is that they have antibodies that come from their mother and those antibodies sometimes can interfere with the vaccine virus, that you give the vaccine and those antibodies get in there and they just gobble up all that vaccine virus so the immune system doesn't really get a chance to respond. That can happen sometimes up until about twenty weeks of age.

The important thing to recognize is it doesn't always happen. And as the puppy gets older, it probably happens less and less. So there's lots of times where we vaccinate a puppy and just one vaccine is all that puppy ever needs. The problem is we don't know which puppy that is and which puppies actually need to be re-vaccinated. So I'm going to show you how that works with a chart on the next slide.

The parvo protocol that we recommend, and this comes directly from the recommendation from the AHA Canine Vaccine Guidelines, is to start with a subQ – it's either a DHPP or a DHPP. It's really the same component. Immediately on intake, if you can't get it into the dog sooner than intake, ideally, dogs would be vaccinated even before they come.

A dog just – once an intake, if there's any doubt that – at all, you can give it again in two weeks or you can recommend to people that they re-vaccinate the dog after adoption, but that is just a safety net. It's not necessary as a booster for that vaccine. For puppies, we recommend re-vaccination every two weeks while in the shelter and giving the last one of those vaccines when the puppy is older than eighteen to twenty weeks of age.

So this is probably the most complicated slide in the whole presentation, so I'll kind of apologize in advance, but it's probably one of the most important things to understand, and this is going to answer the question that the people have about the puppies who had already gotten a lot of booster shots and why did it still get parvovirus?

So what we see here is we looked at this diagonal line that's a little bit purple. This diagonal line represents what antibodies a puppy would have from its mother, potentially. And we don't know – they don't all follow this same kind of line. We could have a puppy that started with antibodies at 4.5. We could have a puppy that started with antibodies at 2.0. Or we could have a puppy that had hardly any antibodies at all.

What we do know is that from the time the puppy is born until out to, it can be, eighteen to twenty weeks that those antibodies decline and degrade and go away. We call it passive immunity. It comes from their mom. And so what we want to think about when we're thinking about vaccines – I'm going to keep giving you the tour here. So this purple line is the vaccine antibody – I'm sorry. It's the antibody titer. And the top black line is the minimum titer that would block virulent virus, so real virus. How many antibodies would you need to block real virus.

This bottom line is how many antibodies you would need to block vaccine virus. And hopefully, you're appreciating from that that the vaccine virus is actually weaker than the real virus. So you need more antibodies to protect you from the real virus than you do from the vaccine virus. So let's say in this puppy at four weeks we gave the first vaccine. If we follow straight up vertically from four, we would say, "Oh, well, that *[inaudible]* – that doesn't do us any good because it's over the place that would block the vaccine virus. So the puppy's immune system doesn't respond to it. But oh, it's okay, because it's actually – their antibodies are higher than the place they need to be to block the virulent virus."

So even though we couldn't immunize the puppy, we also know that the puppy's going to be safe because it's got antibodies protecting it. If we go to six weeks and we do the same thing, we go up vertically, we find the same thing. So the vaccine – there's too many maternal antibodies for the

vaccine to effectively immunize the puppy, but again, that's okay because the puppy is protected. It's above the place that it needs to be for it to be – for vaccine – for a virulent virus, sorry, to be blocked.

Now if we go to eight weeks and we do the same thing, we see, "Oh, now we're still above the level where it needs to be to get – have the vaccine immunize the puppy", but now we're in a problem because now the antibodies are lower than they need to be to block the virulent virus. And this gray box that you see on the diagram is what we call the window of susceptibility. And basically, this is the time period where you can see the antibody level has dropped below what we need to protect the puppy, but not below the place where we can effectively immunize the puppy. And this is one of the greatest frustrations that we have with puppies and parvovirus because there is a point where this window of susceptibility is open.

We never know where it's going to be on any individual puppy. And this is why we vaccinate at two-week intervals because we're trying to get here. And in this puppy, this would be around eleven weeks would be the vaccine that would finally get through the maternal antibodies and would protect this puppy, would immunize the puppy. So that's a really important thing to think about is that every time we vaccinate, we don't necessarily immunize.

And so, again, in answer to the question, if we vaccinate – we could have vaccinated this puppy at four weeks of age, at six weeks and again at eight weeks of age and at ten weeks of age if that puppy was exposed to parvovirus, that puppy – I would get an email that would say, "I vaccinated this puppy three times and it still got parvo. Why is that?" And I would say, "Well, it was probably protected all the other times that you vaccinated it and then when it fell into the window of susceptibility, then it became exposed."

This is the reason that we really, really need to protect puppies, and it's going to lead into the answer to the other question as well. And so before we go to that question, I just want to talk a little bit about pregnancy because this is the other big question that we get all the time is, "Should we vaccinate pregnant animals?" And, "Should we vaccinate nursing animals?" So lactating dogs, no problem. Please go ahead and vaccinate. We really need to get those dogs vaccinated.

The big thing to think about with pregnant dogs, again, the way I think about it is make sure you don't lose the forest for the trees kind of [*Laughs*]. There is no increase risk during lactation. There is a very, very minor risk during pregnancy. So we need to understand what that risk is.

So let's imagine a circle – the top circle here that says previous immunization is one dog. And we say, "Well, okay, if this dog was already vaccinated and we give it a modified live vaccine, nothing's going to happen. Nothing's going to happen to the puppies, nothing's going to happen to the mom because that modified live vaccine is going to be blocked by the immunization that that dog had." So the dog is going to be protected from the vaccine and the dog's also going to be protected from virulent virus.

Now let's go down to this dog down below that, I'm sorry, doesn't look anything like a dog, but this one who's susceptible who hasn't been vaccinated or hasn't been immunized before. And if that dog [*inaudible*] virulent virus, that's going to make her sick. And if she gets sick, there's a possibility she may die, as well as the puppies because being exposed to parvo in shelters is really a reality. If we give her a modified live vaccine, that's going to stop that virulent virus as long as it has a few days to immunize, to let her immune system work so that she's immunized. And then that would stop that transition to disease.

So there is a very slight risk to puppies from giving a mother dog a vaccine, but there's a much greater risk from virulent virus. But in general, we recommend that, obviously, if we can keep pregnant dogs out of shelters, ideally, if we can have dogs vaccinated before they ever become pregnant, obviously, that's even more ideal. But if a pregnant dog is coming into a shelter, in general, we generally recommend for them to be vaccinated.

So this goes now to the other question, is, "How do we balance socialization and protection for puppies? How do we keep the puppies sane and happy while they're in shelter care?" Well – and three to thirteen weeks is the key socialization period, and all these puppies are in the shelter and what do we do? The ideal for me is minimize how much time they're in the shelter. So can they go out on grass? My answer is yes, at someone's foster home [*Laughs*]. That's the best place for them.

Keep them moving through the shelter as quickly as you possibly can. So the ideal is to minimize the time that they have in the shelter. And sometimes shelters use, like, an intake quarantine to find which dogs might break with parvo, and that's probably not a great idea because you're just keeping the puppies longer and longer in the shelter. So use those intakes only for super high-risk puppies.

Visit with puppies in their kennels if you can or in easily-disinfected areas while they're in the shelter for short periods of time. Design – designate special clothing and footwear for each puppy group. And then counsel foster parents and adopters about safe socialization. So limit that puppy-

to-puppy contact for about two weeks after adoption, especially if they came from a high-risk shelter. Vaccinated dogs are almost always safe. And then extra caution going to places like pet stores, dog parks and vet clinics.

This is an example of what we do at my foster home where we let puppies out into the backyard. And in the first two weeks of time that they're with us, we always keep them – if they're going to go out on the grass, we keep them in a *[inaudible]* on the grass so that if somebody did break with parvo, we would know that this part of the yard should be off limits to other puppies that were coming over. But we're very, very careful about watching for clinical signs.

Do we have any questions about vaccinations before we go on to the next section?

*Lynne Fridley:*

Yes, we have a few questions, Dr. Newbury. And here's the first one. I'm going to push it to the slide. "Can you compare what the bare minimum number of DHPP, DAP for an eight-week-old pup is considered fully vaccinated? Would your protocol be different if that pup was housed eight to twenty weeks in a shelter, vaccinations being admitted in shelter than place adopted out for foster care?"

*Dr. Newbury:*

Yeah. So the first thing I'm going to tell you is that – and anybody who's heard me speak before will probably know this is true that I wouldn't want a puppy to stay in foster care for such a long period of time. The recommendations in foster care may be different than that every-two-week repetition, but if the puppy's going to be coming back to the shelter for adoption, then I probably don't go off of that every-two-week rotation. So you can decide whether – the other thing is that some foster homes may not be really much lower risk than shelters. So you have to decide that based on what the foster home is like and where the pup is going. But the idea is that we want that pup protected.

So if a puppy comes to you at eight weeks of age, my hope is that that puppy leaves your shelter adopted within three to five days, to be really honest. That's what I'm really hoping in terms of length of stay and turnaround for puppies. If there's some reason that the puppy needs to stay in the shelter longer than that, then, yeah, we recommend every-two-week rotation and even in foster care. Depending on the foster care and depending on when that puppy is going to be coming back to the shelter, we may extend that, but in general, that's really – that's what we're talking about.

*Lynne Fridley:* Great. Here's the next question. "If a puppy has upper respiratory, giardia or any other medical issues, should it still be vaccinated for parvo? I've heard that this could lower its immune system."

*Dr. Newbury:* Yeah. So it's another one of those kind of forest for the trees kind of thing, but there are very few instances where I would ever tell somebody not to give a parvo vaccine to a dog coming into a shelter. If you are worried about the effect that the vaccine might have on the dog, think about what effect that virulent virus might have on the dog. So in general, this is almost a must-do vaccine. If the dog – this is the rule that I give in the shelters that I've worked in is if you think that the dog is so sick that it can't be vaccinated, then it needs to go to the emergency clinic.

*Lynne Fridley:* Great answer.

*Dr. Newbury:* *[Crosstalk].* Yeah.

*Lynne Fridley:* Here is – we have two more. This one and one other. "How often do vaccinated dogs acquire parvo? And are they generally a low risk to spread the disease if they have mild symptoms?"

*Dr. Newbury:* So vaccinated dogs, to me – I'm going to change your question just a little bit, and I'm going to say an immunized dog. So if a dog was vaccinated after eighteen to twenty weeks of age and has had a bit of time to respond to that vaccine, then almost never will that dog get parvovirus. As long as the vaccine was properly handled and refrigerated and the vaccine was properly administered, then almost never. And you'll see when we talk about outbreak responses, one of the things I'm going to use for you to help you sort of evaluate how at risk a particular dog might be.

And so that is really the great news about those vaccines. If vaccinated dog, what you mean is a dog that I vaccinated a day ago and put into a kennel with another dog who was shedding parvovirus, then the answer to the question sadly changes. And so that's why what we need to do is really put some care and attention up front into the way that we care for dogs as they come in until they've developed immunity to the virus.

*Lynne Fridley:* Good. We have one last question here. "Does the maternal antibodies' interference matter with pups that were taken from them early and supplemented with commercial milk replacement?"

*Dr. Newbury:* Yes, it does. The maternal antibodies come in the first couple days of life. And don't think of them as a bad thing. I know there was a point in my life where I kind of thought like, "Oh, darn, you maternal antibodies *[Laughs]*." But maternal antibodies are really important to the puppies. They help keep them from getting sepsis and they help them stay healthy

in lots of ways. So we love maternal antibodies, except for sometimes when we're trying to vaccinate puppies.

So also, just please remember that maternal antibodies don't always interfere, but we like to write our protocols to help protect all of the puppies in case they interfere.

We're going to talk a little bit about testing. And the first thing we're going to talk about is what we call the parvo snap test. Probably a lot of you guys have seen these before. Hopefully, lots of you have used them before. This one is the one that IDEXX makes. The reason I use the IDEXX test in this, in the picture is that they're a very, very good test. The false-positives are very uncommon with the IDEXX brand test. I don't get any money from IDEXX for saying that, but that seems to be showing in many studies that we see that these tests are very reliable.

The problem with – and this is an antigen test, so what we're testing for is actually the presence of the virus. And the problem with this is that we sometimes can see what we call a false-negative. So that means that the dog is infected, but we're not seeing that when we're running the test. And the reason for that is that sometimes, even though the dog is infected, they're not shedding at the time that you took the test. It may also be that as a dog is – his immune system is responding, that the antibodies get bound – the antigens, sorry, gets bound up with the antibodies in the dog. And so when you go to look for those antibodies, you're not finding them.

And so it can happen. It's fairly uncommon in the first few days of disease, but as we get further and further into disease, you may run a test on a dog and have it be negative. So what I tend to tell people is if it's positive, believe it. If there's a reason that you ran the test in the first place and if the test comes back positive, even as a weak positive, you should take that as a positive. If you run the test and it's negative, you should do more testing if you really thought that the dog might have had parvo in the first place because a negative doesn't necessarily mean that it's really negative, whereas a positive should really be believed.

IDEXX testing, as I said previously, works very, very well for all strains of parvovirus, including the 2C. So the 2C works just as well as 2A and 2B with these tests. It also detects the feline parvovirus isolate from the 1960s through to the current isolate. And so this is – it's very important and again, very, to me, sort of comforting to know that even though the strains are changing, that all our tools still work just as well as they ever did. They aren't perfect tools, but they're pretty good.

So if you get a negative, what else can you do? You can do blood smears. In cats, parvovirus is called panleukopenia and what that means is that all

of the white blood cells are low. And so we can look for that in the blood smears. With the necropsy, we can look for what's called segmental enteritis, and this is actually intestines in a dog who died and you can see there are sections of the intestines that are looking really inflamed and ugly and that is what we call pathognomonic for parvovirus on a necropsy in a dog.

The pathology is referred to as kind of the gold standard to see if we see parvovirus there, but obviously, that's on the *[inaudible]* side. Recognizing parvo, as I said, are very – it's very, very important to do because the longer the dog stays there, we have those welfare concerns and we also have concerns about parvo going into the environment. So in some cases, this means that we should be doing intake testing for sick and high-risk puppies. We should be doing daily rounds where we're really looking at an animal. If you go to a kennel and you see a poor dog who looks sick like this and you see this in the kennel, this is a dog who should be tested for parvovirus.

We always want to train our staff to do some evaluation before going into a kennel and before cleaning so that if we see a dog like this, hopefully your care staff is trained, "Oh, I see that. I should go get somebody before I walk in so that I don't end up exposing everybody to parvovirus." You can also document and map those test results so that if you end up having quite a number of cases, you can see if they really seem to be individual cases or if they're spread within the shelter.

So here's a great example. This is going back to my shelter who had the outbreak that I thought wasn't 2C, but it was. And here's what we saw as they started, kind of, mapping out timeframe and things like that. So, here we see there was a dog that came in on October 3<sup>rd</sup>, was diagnosed on October 4<sup>th</sup>, the dog that came in, and two days later, again – one day later was diagnosed.

And so what you can see here, I'm hoping, there was a very, very short period of time – this is a shelter that had called me because they thought they were having an outbreak. And when I had them send me all the information for the individual dogs, what I hope you're seeing, this was not a shelter outbreak, but this was actually a community outbreak because these dogs were all coming to the shelter sick or about to be sick. And that was really important for that shelter to be able to recognize, that those dogs were showing up sick and actually not getting sick within the shelter.

And this was actually – I'll show you a little bit more in a few minutes about that shelter, but that was actually in the City of Oakland that they ended up having a parvo 2C outbreak in the community. We ended up hearing from many shelters in that community about that.

So what about when it's not behaving the way it should? It's important to look further. So when we find that dogs that are vaccinated over seven days ago and they're over five months, if all the normal things are working and you've already looked at histopath and you know that the dog's actually had parvo, this is the time where you should be contacting a specialist where things are not working the way they should. So that's important to kind of keep in your – in the back of your mind about kind of, "When do we kind of recognize that we're outside of the realm of where we should be?"

I'm going to move into sanitation and disinfection, Lynne, and then get – and then come back for questions just so I can kind of keep things moving along and I don't run out of time.

*Lynne Fridley:* Okay.

*Dr. Newbury:* So when we talk about sanitation and disinfection, I know I've talked a little bit about this already, but I want to make sure that I'm covering it again, is to really understand that this virus can survive for a long time in an environment. Drying out seems to be really great, but just leaving it sit isn't going to get you where you need to go. That you need to do more than that to get rid of this virus. And so this is the slide that I always think about with this is that we don't have to burn down the whole house in order to get rid of it, but we do need to really be active about trying to get rid of it.

I hear a lot of shelters that say, "Oh, don't use this kennel for a month" or, "Don't use this kennel for three days" and that's not going to get anybody anywhere. What you need to do is really get in there and mechanically remove. So after three cleanings, you can use the kennel, but not after three days where you just leave it sit. Freezing doesn't kill the virus. That's the way we keep the virus if we want to use it for research purposes. But getting in and really, really cleaning with a good disinfectant is the way to do it. And that's the same thing for contaminated areas in the shelter and for foster homes as well.

We really want to be care about the way we clean. Make sure we get into nooks and crannies. Want to use an effective disinfectant and use it for the appropriate amount of times. And then, again, as I said, drying helps to kill the virus as well. Be really careful about fomite transmission, so carrying the virus from one place to the other. And I've got this picture of the mop because I really think that this is just a perfect fomite for parvovirus. So bleach water and disinfectant can work when they're clean themselves, but when we're constantly adding organic material back into that disinfectant when the disinfectant that you're using isn't clean that in itself can become a fomite. So we really want to make sure that we clean

first and then disinfect. And whenever possible, stay away from mops that can bring contaminated material from one area to another.

Which disinfectants work and which ones don't is a very important thing to understand when we're working with parvo. I've seen some shelters just in heartbreaking situations using disinfectants that they were sure killed parvovirus that, in fact, weren't having the effect that they wanted. So on the yes side, we have things like bleach and things, bleach itself and things like bleach. We have trifectants, accelerated hydrogen peroxide. These are the things that we know are effective at killing parvovirus.

Quaternary ammonia compounds, even though many of them make label claims that they do kill parvoviruses, in independent testing, we see, in fact, that they don't. And we don't really have a great reason to think that they do. In most cases, they're very, very strong detergents and they're just – they don't have in them what is needed to really denature those un-enveloped viruses. And so sometimes these things have names that are even things like Parvo Stop or Parvo Kill, but look for those and make sure you're using something that's on the yes list if what you need to do is be killing parvovirus.

Just basics about bleach. It's a half a cup of five-percent household bleach per gallon of water. If you store that in a lightproof container, that can be stable for probably about a month. Many people think they have to dump that out every single time. If your container isn't lightproof, then you do increase that reaction time, but otherwise, you can, in fact, store that.

We really love to [*inaudible*] trifectant because they work very well in the face of organic material. They're also really great cleaners, and so they're what we call one-step cleaners. And so those tend to be the things that we tend to lean towards. When you're cleaning, everything you can do to minimize entry into the run. And if you have them, use double-sided runs where you can move the dog from one place to the other while you're cleaning because then during that cleaning process when that's the time where exposure is most likely to happen, but it won't happen as readily if the dogs are staying in their kennels. So any time you need to pull the dogs out during that cleaning process, the likelihood of exposure is much, much higher.

That's not to say that what I want you to do is clean the kennels with the dogs in them if you only have a single-sided kennel. But if you do have double-sided kennels where the dogs would be out of the way of the spray, then really consider that. Also consider if you have double-sided runs, to consider spot cleaning for dogs where you don't need to do an absolutely thorough cleaning every time you clean the dog. If the front side of the

kennel isn't dirty, then you don't need to go back and clean it. And that will also minimize exposure.

Don't rely on foot baths. We have – I have a collection of photographs of disgusting foot baths from around the world. They take so much effort and time to maintain appropriately, and what we see is most of the time they're not and we really believe that they contribute most to the problems that we see with spreading disease than they help. If you really, really feel like what you need is to protect from transmission from feet and shoes, then what we recommend is to go with some kind of shoe covers or shoes that can be shared rather than relying on the foot baths because we just don't see those being successful in shelters. And even if they are successful, the amount of staff time that's required to maintain them in an adequate way is just not worth that investment. And the shoe covers do much better.

Any time you can set it up so that there's separate equipment for each group, either moms and litters or each group of puppies, that's great. There's one shelter where they've got a separate pair of boots and a separate suit for each one of these little housing areas so that none fomite transmission happens. They also actually have a separate – like a jumpsuit that go into each one of those runs.

One of the things that this was – again, there was the question about, "Can puppies go on grass?" This picture is actually two of my favorite technicians taking out a litter of puppies who had just recovered from parvovirus. And so I always include this in my slides because these puppies were just fine to be out on the grass because we knew there was no way they were going to get parvovirus again.

Ideally, foster homes have some kind of *[inaudible]* area or paved area that can be disinfected. And ideally, we get puppies out of the shelter as quickly as possible. So it's really hard. I'm definitely recommending that you find some kind of balance. I am not recommending take a three- or four-week-old puppy and put it in a kennel and never let it out until it's twenty weeks of age, but we really need to get those guys moving through as quickly as possible. If you need to keep them in the shelter, then you need to find protective areas to keep them in. But in general, my answer is – "Can puppies be on grass?" I say yes, in a foster home.

Indoor space are just as important to think about as the outdoor space. Launder or discard heavily-contaminated items if they've been exposed to parvovirus. Really careful mechanical cleaning will get you a long way. We recommend either accelerated hydrogen peroxide or trifectant for things like carpeting or other things in your home. And then we usually recommend that that is repeated about three or four times before animals

are left back in. If it's an outside area, then we recommend to limit puppy access for one to three months. But again, that time period isn't going to make much difference. It's more about how aggressively the person can get into clean.

So the reason that we've got that time period there is that's about how long it's going to take to really – if they're cleaning on a regular basis, to get their home clean. So that brings up a really important point, which is just this question of recognition and cleaning before animals go into foster care is just crucial because once you've sent a puppy out into foster care and the puppy gets parvo in that foster home, it's emotionally very difficult for everybody and then you've lost that foster home for puppies. So whatever is the time period for that person to be able to effectively clean. And sometimes they're not able to even do it to your satisfaction. So it's very, very important to really be careful and teach your foster parents to recognize those clinical signs to minimize any *[inaudible]* that might happen.

Cleaning the animals. Again, that can be done and should be done before. If you have animals that you treat and animals that are going back into the general population, the virus can live on their coat and on them. And so you want to make sure that you give them baths before you put them back in the general population. And also important to wear protective clothing when you're doing that to make sure that you don't end up being responsible for fomite transmission as well.

We're moving into the second part, but I wanted to see if we have any questions before we, kind of, move into our outbreak and treatment section.

*Lynne Fridley:* Yes, we do, Dr. Newbury, and here's the first one. "You mentioned that you hoped any puppy would be adopted three to five days from intake and vaccination. What about a hold period? Do you recommend holding for a number of days prior to allowing adoption?"

*Dr. Newbury:* I really don't. And so obviously, in some places, there are legal holding periods. And my favorite communities are those that have been able to get rid of those *[inaudible]* holding periods for puppies because I think it's so important for the welfare of those puppies. And there's a few of those communities around the country. I think San Antonio was the first who was able to change their ordinances. And there's been several others who have – who followed suit that allow those animals to move through the systems more quickly. And it's just so important for their health and wellbeing.

So in general, I should say, I don't recommend a holding period. There are some shelters that are taking transfers, especially from other very high-risk shelters, and for those shelters, we recommend a protocol that I'm going to talk about a little bit where you do some *[inaudible]* to decide which puppies are the most at risk and you hold on to just those at-risk puppies and let the puppies who are not at risk move through so they don't become at risk.

But in general – and this is a hard thing for us to think about in animal shelters because it's sort of a tough realization to make, but in general, the risk of infectious disease in an animal shelter is significantly higher than the risk of infectious disease that's coming from the community. The other thing that happens in the shelter is that it's very, very difficult to really effectively isolate or quarantine a puppy. And so if you have a room of puppies, say, that you're holding onto to see if they become sick, well, what happens, at least in my experience, is that those shelters end up finding puppies getting sick in their care who could have moved on and never become sick.

So we will talk more about this as I talk about sort of how we manage moving animals through, but in general, again, the goal, from my perspective, is to try to move puppies through the shelter quite quickly. And this is true for kittens as well. And that the thing is that you want – if you do that, you – I'm not going to promise you, you will never adopt out a puppy that got parvo – that had parvo because it may be that there's an occasional puppy who comes to you who was already infected with parvo and wasn't showing any clinical signs and you adopt that puppy out and later that puppy breaks with parvo.

But what I hope for you is that you'll never adopt out a puppy that got parvo in your shelter. That's something that you can prevent, but you can't prevent the other. And so that's really – that's kind of the foundational piece of why I don't, in general, recommend holding. There are some instances, again, where the risk is high and we recommend holding onto some puppies. And we'll come back and talk about how we really evaluate risk and how we define what at-risk means. But as a general statement, no, I don't recommend holding onto them, unless there's some very clearly defined reason and a benefit to the pup.

*Lynne Fridley:*

Here's a – we have three quick questions here, Dr. Newbury. "Some fosters use natural cleaners such as vinegar. Would that work?"

*Dr. Newbury:*

No. Only the things that were in the yes column on that slide are going to be things that will actually kill parvovirus. A great detergent is a good thing to use because it will help to mechanically remove the virus, but if what you need to do is kill the virus, and that is what you – the idea is that

you'll use a great detergent that will mechanically remove the virus, and then you go back and kill whatever virus was left. Then that's how you'll get those clean.

*Lynne Fridley:* And there –

*Dr. Newbury:* I'm going to –

*Lynne Fridley:* Okay.

*Dr. Newbury:* I'm going to go on –

*Lynne Fridley:* All right.

*Dr. Newbury:* – and just give – so we're going to talk about outbreak management now and kind of get into talking about just sort of the general vision of, "How do we – how are we going to think about managing what might be an outbreak in the shelter?" But really, this is coming from the perspective of both, "What would we do if it happened? And what do we want to think about before it happens so that we can be sure to help with prevention?"

So we're going to think about screening on intake. I talked a little bit about that, but crucially important. And that means screening both for clinical signs and then making choices about which animals need diagnostic tests and which animals don't. We're going to vaccinate on intake and always put animals into clean, disinfected kennels when they get to the shelter and especially thinking about that for the first three to five days until they're vaccines have had a chance to work.

We're going to closely monitor the animals every day, and that's just kind of following up on that screening for intake because the sooner we know that animal is sick, the sooner we can do something about it. Provide special protection for babies. And so this is something that is kind of counterintuitive to what a lot of shelters think is that we want really nice double-sided runs for puppies because those are the animals that we really don't want to be pulling out during cleaning time. We really want to give them lots of special protection.

So for some shelters, they use double-sided stainless steel cages with a portal in the middle like we often [*inaudible*] for cats. Other shelters are going to use, like, a double-sided kennel. And we always want to have that short length of stay for babies whenever we can. Testing when we need to. So if we see a sick animal, we really want to get that testing in. You're not going to save money, ultimately, by trying to save money on tests.

Response is incredibly important and this is one of the things that for me is just heartbreaking in shelters where I see that a sick dog is recognized, but nothing is actually happening, the shelter is not responding in the way that they need to, to prevent the outbreak or to manage the situation for that individual dog. If you're going to treat, you need to be able to have real isolation. This disease is very easy to spread, and so you need to be able to create a real isolation space.

So when in post-exposure are response necessary? And this is kind of the question of, "When do I think this might be an outbreak or when do I not need to worry about it and think maybe it was just an individual case?" But the way that we kind of break it down is to think about it both as kind of a population risk and an individual risk. And the things that we have listed here like, "What's the daily disinfection practices?" "Is the environment one that can be disinfected?" All of these things, looking at them each individually and kind of asking these questions about the situation will really help decide, "Wow. Do I need to respond in some way, other than just caring for that individual animal?"

So if it's a shelter that doesn't frequently test and they hardly ever monitor and there's lots of crowding and the environment is difficult to disinfect, then that's going to push you towards saying, "Yep, we need some kind of response." And from an individual perspective, kind of the same thing. If it's a dog who's less than five months of age and there's not much vaccine history, then that's going to push you more towards thinking, "Oh, yeah, this is something that's concerning me."

This is something that we have touched on earlier, but knowing that kind of three-to-five-days range can really help us start to think about, "Well, who's high risk and who's low risk?" So if we – say we test a dog here on the 16<sup>th</sup> of January, we can say, "Oh, wow, the dog, they're probably – that dog was probably shedding about three days prior to when we got this positive test." And we count back from the 16<sup>th</sup> to the 13<sup>th</sup> and we can say, "Oh, this is probably when exposure started." And then we count back five days from that because we know that any dog that was vaccinated five days before this exposure was most likely protected. We can say, "Anybody with an intake on the 7<sup>th</sup> or before would probably not be getting sick from an exposure that happened on the 13<sup>th</sup>."

So this is a way that we can use all this information that I was kind of pounding into you the first half about, "Well, how do vaccines work?" to help us understand what the risk really is. So in a shelter where we have a case, if it turns out that there wasn't another intake between the 7<sup>th</sup> and the 13<sup>th</sup> and we're vaccinating on intake, the only dogs that we might be worried about would be the puppies here because even though we had vaccinated them, some of them may have not been immunized by those

vaccines. But if you're an adult dog and you've been vaccinated five days before the exposure, then you wouldn't need to worry as much.

So that's kind of just one way of understanding how we can evaluate risk. Once we know if we need to respond, then we would follow kind of these general principles. These are kind of the steps that I think of as how we kind of approach that response. The very most important thing is to stop the cycle of transmission, so no more fuel for the fire. And in order to do that, we isolate or separate the sick dogs, we identify susceptible dogs, send low-risk dogs on their way. How do we do that? Well, I showed you one way with the calendar, but I'm going to show you another way as well. And then we provide the care that sick dogs need.

So step one is what we call setting up a clean break. And what we do when we're doing this is we divide the dogs that are coming in and we call them the new dogs or we call them the clean dogs or we call them the unexposed dogs, whatever you want to call them. We put them into a separated area so that they don't go into the area where infected dogs have been. That can be that they go into an area, but we pick an area where other dogs have been and you clean the heck out of it and disinfect that area beforehand.

Ideally, you actually even have separate staff or you have your staff go into the clean area first and once they've gone back into the exposed population, they never go back to your unexposed population. And so to stop the cycle, I kind of created this little series of diagrams just to, kind of, show you what I'm talking about. And so in this case, the clean break would be here between the new incoming dogs and that exposed population. And new incoming dogs could even come in, stay in the shelter and all the adopted never coming into contact with this exposed population.

All the while, you're going to be dealing with your outbreak or whatever it is that was happening within your exposed population but this is a way to continue on with the things that you're doing in the shelter, even though you're having cases. So that clean break is really important and it really stops the cycle of transmission where new dogs are added to that exposed group.

The next step is to really evaluate for clinical signs. Now we're going to be working within that big circle of – that I showed of exposed dogs. You're going to carefully evaluate each dog and really, really carefully. Any suspect clinical signs have to equal a high-risk dog. So even a dog that you thought was vaccinated, if we see clinical signs that are consistent with parvo, then we have to call that dog a high risk. Or what we normally would say about this is any unexplained GI disease, a dog who's

not eating or a dog who just what we say is "Not doing right" that should be a dog that we understand as being a high-risk dog.

Again, depending on the level of concern in the shelter. That wouldn't be true if all you had was one dog who was infected with parvovirus and everyone else in the shelter is doing great and you rarely see parvo. But as we start thinking about those group pieces and the individual pieces, then we need to know that a dog with clinical signs would be considered high risk.

So here's kind of an evaluation overview of what we would say. We have an exposed population, we look at the clinical signs, and we would say, "A sick dog is on one side and a dog with no signs is on the other." And then we still have our clean-break piece on the other side. If as we're doing this risk evaluation overview we have a new incoming dog who has clinical signs and is sick, then that dog would go on the other side of the clean break. And so that's a really important piece of this to make sure that your screen is very diligent for those new incoming dogs so that you don't end up having both sides of your clean break end up being an exposed population.

So now we're going to go back and sort of evaluate risk for individual animals within the group. So high – and basically, all we're doing is dividing them into high-risk and low-risk groups. Again, we can't evaluate dogs with clinical signs because once they have clinical signs, we need to put them into the high-risk setting. We do this mostly using antibodies and the vaccine history. Sometimes we'll use only the vaccine history if there are no resources to do the antibody testing. But I'll make an argument that doing the antibody testing will get you a long way and save you money in the long run and is actually an incredible lifesaving tool.

You can do that antibody testing either in house or you can send it to a diagnostic lab. Doing it in house is faster, but you kind of just get a yes-or-no answer. Doing that antibody testing in house, you can either use what's called a titer check kit or this newer testing, which is called an ImmunoComb VacciCheck. The VacciCheck is, I think, much easier for shelters to use and we've had a lot of shelters use it and really happy with it.

Remember, when you're looking for immune for antibodies, that a positive test in this case is a good thing. Not like when we did the snap test and a positive test means that the dog is sick. In this case, a positive test means that the dog is low risk and that's what we want. And all this is telling us is that the dog has sufficient antibodies to protect it from virulent virus.

And so if we see that positive titer, we know that dog is low risk. And what we'd recommend is send them home. Inform potential adopters, if you feel like you need to, that there was a problem in the shelter, but that you've identified that this dog is a low-risk dog. If you can, you can move dogs as cohorts whenever possible. And then if all the dogs in one cohort are low risk, you can even combine that cohort back to your clean population because now everybody in that group is low risk.

If the dog has a negative or a low titer, then that equals high risk. That doesn't necessarily mean the dog is going to get sick, but it does mean that the dog is susceptible to the disease. What we see happening in most cases is that we find that the dogs are – that if we take a whole shelter of dogs or we take a whole group of dogs and we look at the antibody titers, what we find is that there's usually about a handful of dogs who are high risk and most of the dogs are low risk. And so that turns what could be a kind of unmanageable situation into a situation where there's only a small number of animals who need some kind of special care. And what we find is that then it turns that kind of unmanageable situation into a manageable situation.

Sorry. I'm trying to push to the next slide. So we look at – this is an example of a shelter where we looked at blood from animals. And you can see here that we've got the ages on the left side and then here's the results of their titer testing. And hopefully, you can appreciate in this whole group of animals that there were only a few animals who actually needed – who were high risk. And so here's a little five-month-old puppy with no titer for parvovirus, and here's a three-year-old dog with no titer for parvovirus. All of the other dogs ended up being low risk and could just move on. And so that was great news in this case.

Here is the results from the titer testing that we did in the Oakland shelter that I was telling you about earlier. This shelter was just about to send a transport of all of these dogs to another shelter. So this was a huge lifesaving effort that was going to happen, but they were seeing all this parvo. They didn't want to send parvo to another shelter, so we said, "Well, let's do antibody testing." And what we found was that almost all of those dogs were low risk and were perfectly fine to go on that transport. They found foster care for these three dogs and none of them got sick because, in fact, those vaccines protected quite nicely, even for parvo 2C in that case.

So just if we think about that kind of risk evaluation and where this ends up, we're going to add the titer testing to the rest of our diagram, and we see that, in fact, that the dogs are protected with the – they have a more risk if they have a positive titer, a higher risk with the negative titer, and we can move them right through the system.

So once we find out that, then we kind of figure out, "Well, how high risk is high risk anyway? Is the shelter doing great and this puppy just doesn't have a titer?" Well, then we feel like we can sort of figure out how worried we need to be by kind of going back to these original considerations.

Once we've done that, now we're going to move the animals around. And where do we shuffle? But basically, what we're going to try to do is create a quarantine area where we can protect the animals who are high risk and protect everyone else from them if they were to become sick and move the low-risk [*inaudible*] positive-titer, low-risk dogs over to that clean-break area and find a way to quarantine the others.

There's a fourteen-day requirement because there's a fourteen-day incubation period for the virus. And so if we don't wait that long, then those animals could break later on. But again, what usually we find out is that there's only a small number of those animals who need that kind of quarantine, and this is a much more effective kind of quarantine than if we just randomly quarantine every dog who was coming in.

One of the questions that comes up quite often is, "Can you safely send those dogs somewhere else for the quarantine?" And the answer is yes, but what is safe? And so the idea is that we send them places where there's well-vaccinated adult dogs, human will be able to handle it if the dog gets sick, ideally, somewhere where there's no puppies in the house and somewhere where there's no uninformed adopters because we don't want to send those puppies on into environments where the adopters aren't aware that there's a possibility that those puppies may become ill. So it's great to do that.

So again, I talked a little bit about the No Puppy Left Behind. San Francisco SPCA is using this protocol now and it's been fantastic for them. Rather than quarantining all the dogs that are coming in from shelters all over the place where they are taking dogs from, they're able to look at their antibody titer, do those antigen tests, and then the dogs they can – the puppies they can identify as low risk are moving on and they're only doing that intake quarantine for those high-risk dogs.

These are life-or-death decisions and the risk evaluation often allows many dogs to be saved. It used to be a long time – not even that long ago that people understood that depopulating was the best response if parvovirus was present in a shelter. And we've come such a long way from that to really knowing that we can intervene and we can turn a really unmanageable situation into a very, very manageable situation. And I think that's one of the most important things we can do.

Long-term prevention should be part of your daily planning because parvo can always sneak in. So all of these things that we've talked about doing are things that just need to be part of everything you do.

The last thing we're going to talk about is treatment. And we only have a little bit of time left, but I'm only planning to kind of just touch on treatment. The real basics for treatment are doing supportive care. Providing hydration and cleanliness is so important. Giving the antibiotics that are needed. One thing I just wanted to touch on very briefly is that the use of Tamiflu has been recommended in lots of anecdotal ways, but that we've not seen any research studies to show that that's effective. And the – that seems to make sense, really, because we don't really see that there's any – Tamiflu is a drug that is targeted towards influenza virus and not actually targeted to parvoviruses at all.

One thing that I think a lot of people are not aware of is that the success rate for treatment for parvo can be very, very high. Many vet clinics report 75 percent or 90 percent success with hospitalization. Some people say anecdotally that the results with home care are less, but even so, those are reported as being about 50 percent. And the thing that I wanted to really make people aware of because it's been so exciting to have this information out is that the Colorado State University did a great study looking at what we call an at-home treatment protocol. And I think they really should have called it the in-shelter treatment protocol study.

What they did was take 40 dogs, admit them to the study, and they randomized them into two groups. One got a gold-standard treatment, which was hospitalization and IV fluids and antibiotics and the others were sent home for at-home treatment. And what they found was that the survival rate was just about the same. And look at how fantastic they both – both of these were. Eighty-five percent and ninety-five – ninety percent. And so we think of parvo as being a really deadly disease and it certainly can be, but with effective treatment, it also can be very survivable and the treatments that we provide can be unbelievably lifesaving.

So here is kind of their at-home protocol. For the veterinarians here in the office, I hope you'll also look up that research study. It's very – it's nicely done and the information about it is pretty readily available. Cerenia is a drug that can be given once daily. It's an antiemetic, which means it helps with vomiting. It has a double mechanism of action. And the other lovely thing about it is it actually works to reduce pain as well.

Convenia is a drug, an antibiotic that can be given once and will last two weeks. And then they gave subQ fluids. And so that is their study protocol. They saw great – really incredible results with it, so I hope

you'll consider treatment because I think many shelters think that treatment is just not possible, but it is possible and it's important to do.

One of the things that's really important to think about with treatment and it's included in their protocol is just to remember to treat for pain. This is a – it's a painful, ugly disease and so we need to be sure that when we're treating, we're treating for pain, as well as treating for all the clinical signs as well. We want to be sure to include a de-wormer as part of our treatment plan because having intestinal parasites may actually make many of the clinical signs of parvovirus worse because that's where the virus is doing its work. We want to make sure that we're monitoring for wellbeing and monitoring all the other sort of normal parameters for the animal as well as we're doing all of that.

So that's kind of a pretty brief summary on treatment. But the summary – kind of in summary to sort of wrap up what we're saying about parvovirus, as I've said, it's one of the most horrible really infectious diseases we battle, but it's also one of the most preventable. Prevention really becomes a community responsibility. And everything we can do to talk about that in our community is really so important. Don't wait for an outbreak to put those good practices in place.

I know there are some communities that I've worked with who never, ever saw parvo and then all of a sudden they got really kind of – it snuck up on them. So always worry about it. I don't want you to be too paranoid, but I guess I want you to be maybe just a little bit paranoid. Help work towards a community solution. And the more dogs that get vaccinated in the community, the less likely you will see parvovirus. Parvovirus is everywhere, but we don't see it in a lot of dogs in communities where vaccination compliance is very good.

That you for your time. I have time for some questions. And sorry we – I didn't stop for questions because I wanted to make sure we would get through everything, but I have a little bit of time that we can do some questions now.

*Lynne Fridley:* Okay. We –

*Dr. Newbury:* My little [*crossstalk*] with – yeah, okay.

*Lynne Fridley:* Your little monsters? They're not monsters.

*Dr. Newbury:* No, I said this is our motto is that these are my three dogs and I just want to tell everybody that I really believe that every herd can be managed with the right tools. In this case, our tool was pizza.

*Lynne Fridley:* And you have their attention, obviously [*Laughs*]. Oh, that's great. So there are a few questions, Dr. Newbury. "What can you do if you're experiencing a community outbreak?"

*Dr. Newbury:* The thing you can do is, again, to do everything you can do to work in your community to get dogs vaccinated. One of the things that the Oakland shelter did in that case was once we realized, "Wow, this is coming from the community", they actually worked in the community to try to provide vaccinations for people, but they also became very, very terrified [*inaudible*] dogs who were coming into the shelter. They increased the level of screenings, they increased the level of monitoring, and making sure everyone's getting vaccinated. Those are the things that you can do.

Again, one of the things that's great about really understanding the basics of all of these diseases is understanding that mostly what you need to do is stick with the basics and knowing – stick with the things that you know.

*Lynne Fridley:* Great. Here's another question. "What is the best way to confirm that a parvo-resolved puppy is actually not contagious before it is brought to the kennel for adoption?"

*Dr. Newbury:* Our general rule is two negative snap tests after clinical signs have resolved. Two negative snap tests and a bath.

*Lynne Fridley:* Great. Here's another question. "How can a shelter effectively clean gravel pens?"

*Dr. Newbury:* Hmm. Not very well, which is one of the reasons that we don't recommend to have gravel pens. And so this is one of those if you have gravel pens, probably you want to have them for dogs who are well vaccinated and over five or six months of age. But even still things like coccidia and things like that are very, very difficult to get out of the gravel. So obviously, this doesn't work for everybody, but anything you can do to get those paved in ways that can be disinfected is ideal. But if you can't, limiting the access to dogs who are unlikely to either be susceptible or to shedding parvo is the best thing to do because they're very difficult to disinfect.

We've had some shelters who work with trifectant or accelerated hydrogen peroxide to try and disinfect and it may have some beneficial effects, but probably you should never think of it as actually really disinfecting the gravel.

*Lynne Fridley:* Excellent. Here's one more. "Should you wash them before moving them back to the clean population?" I'm sure they mean the dogs or puppies.

*Dr. Newbury:* I think they mean the puppies. And yeah, I think ideally, you do because if they've been living in a kennel and shedding parvovirus, that virus can get on their coat. And so ideally, you want to. Also, if they've had parvo, in most cases, a bath is probably just the perfect thing before they go out to the adoption floor [*Laughs*].

*Lynne Fridley:* Great. And one last question, Dr. Newbury. "Do maternal antibodies interfere with titer tests?"

*Dr. Newbury:* Maternal antibodies. That is a great question. I'm sorry that I didn't mention that. I wouldn't say that they interfere with antibody titer tests because – but they do show up in the test. And so one of the things with puppies, when we do those tests in puppies, one of the things that we see is that sometimes the test is positive, but that's because of maternal antibodies. We used to think, "Oh, it's only maternal antibodies. That's not good enough." But what we found is that the maternal antibodies are good enough to actually protect them. The problem is you don't know how long those material antibodies will last. And so because you don't know that, you need to move that puppy out of the shelter as quickly as you possibly can.

*Lynne Fridley:* Very good. Well, we've had some really great questions tonight. Unfortunately, we didn't have time for all of them, but we're going to handle some of these unanswered questions in our blog. So if you're not signed up for our blog, go to our website and please sign up. And this will be something that will be coming up. So that's the end of our event tonight. And we want to thank Dr. Newbury and all of you for being here tonight.

We'd also like you to click on the link that you see on your screen and take our survey. If you don't see it, it may have been blocked by your popup blocker or it could be on a different screen, but that's okay. We'll be emailing the link to you. And we'd really appreciate it if you'd take a few minutes to respond.

We have a summer series of webcasts coming up. On July 24<sup>th</sup>, we will present What We Know About Free Pet Adoptions followed by How To Change The Way Animal Groups And Veterinarians Work Together on August 7<sup>th</sup> and finishing with How Animal Shelters Can Treat And Prevent Heartworm in Dogs on August 28<sup>th</sup>. Get more information and register on our website at [www.maddiesinsitute.org](http://www.maddiesinsitute.org). We've enjoyed sharing our evening with you. Goodnight.

*Dr. Newbury:* Goodnight.

*[End of Audio]*