

Canine Distemper Virus: Anatomy of an Outbreak

One shelter's experience getting rid of a microscopic enemy

BY MIRANDA SPINDEL, D.V.M., M.S., ASPCA AND BOBBI ALLEN, ANIMAL WELFARE SOCIETY



JOCELYN LAYMAN/ANIMAL WELFARE SOCIETY

After a distemper outbreak caused some sheltered dogs to get sick, titer-testing helped the Animal Welfare Society of West Kennebunk, Maine, figure out which dogs could be safely kept in the adoption area.

The Veterinary Perspective: Miranda Spindel

As the director of veterinary outreach at the ASPCA, much of my work involves answering questions and consulting with humane organizations across the country about infectious disease control. Recently, I've been receiving an increasing number of questions about canine distemper virus (CDV), particularly from groups involved in

transporting animals from regions where adoption may be unlikely to areas where resources and homes are more abundant.

Organizations involved in transporting do risk bringing infectious diseases like CDV into the receiving shelter along with friendly and adoptable dogs. But in most cases, the risks associated with transport can be mitigated with some commonsense measures, and are far outweighed by the potential to save lives.

Although many veterinarians and animal care workers think CDV is rare, it's actually still present in many communities, often persisting in wildlife populations. Raccoons, foxes, skunks, and coyotes can circulate and transmit distemper to dogs. CDV can easily enter a shelter, is difficult to distinguish from other canine respiratory diseases, can be tricky to diagnose, and may slowly wreak havoc in a shelter's dog population. Shelters

[shelter medicine]



In the wake of the outbreak, all asymptomatic dogs with positive titers (indicating a low risk for canine distemper virus) remained in the adoption section. The one dog with a low titer result (and therefore a higher risk of infection) was kept isolated.

need to be aware of the clinical signs of CDV and know steps to take to confirm cases and stop transmission.

My first contact with the Animal Welfare Society in West Kennebunk, Maine, came in October 2009. After learning that this shelter was experiencing some unusual canine respiratory disease, a colleague from the ASPCA introduced me to the shelter's co-manager, Bobbi Allen. In her first e-mail to me, Bobbi wrote, "Hopefully you have some insight or suggestions for us. We have an outbreak of disease affecting a large number of dogs here at our shelter."

Escalating Illness

The Animal Welfare Society was a well-run shelter with first-rate shelter medical health care protocols. Following shelter medicine standard recommendations (available at aahanet.org/PublicDocuments/VaccineGuidelines06Revised.pdf), the shelter was administering modified live Da2PP vaccinations and intranasal trivalent kennel cough vaccines to all dogs on arrival. Like many well-resourced Northeast shelters, the

Animal Welfare Society was bringing in dogs and puppies from partnering shelters on a monthly basis. New arrivals were isolated from the general population for a week after arriving at the shelter.

Bobbi explained that canine respiratory disease seemed to be escalating. Some months earlier, a puppy had been transported, spent a short period of time at the shelter, and then was euthanized with severe respiratory disease. The puppy's clinical signs of nasal discharge, cough, and subsequent pneumonia were consistent with distemper—though unfortunately, a confirming necropsy was not performed.

At the time, shelter staff felt that other dogs hadn't been significantly exposed. However, cases of respiratory disease recently seemed to be increasing and not responding well to the typical therapies the shelter customarily used with success. The shelter had been keeping good records of affected animals and did not detect any particular pattern. Young and geriatric dogs were affected. Some dogs became ill soon after entry; some recovered, and then became ill



In a pinch, a well-signed curtain can help direct employees away from isolation areas. But the Animal Welfare Society took its containment procedures even further, creating a separate area where it could isolate sick dogs and where only two specific employees were allowed to enter.



Nasal swabs on dogs with varying symptoms helped the shelter rule out the possibility of canine influenza as the culprit behind the outbreak.

a second time. Some became only mildly ill, while others developed severe pneumonia.

Bobbi reported that out of 55 dogs housed at the shelter, 20 were showing clinical signs of significant respiratory disease: coughing, thick nasal discharge, vomiting, lethargy, loss of appetite, and some pneumonia. These dogs were on broad spectrum antimicrobial coverage, but Bobbi was quite concerned, as they had recently had two dogs with signs of respiratory disease die at the shelter.

Although the shelter did not have a staff veterinarian, veterinary guidance and support from the community was strong. Recently, a community veterinarian had performed a polymerase chain reaction (PCR) panel test on one of the very ill dogs. Results were negative for canine influenza virus, *Bordetella bronchiseptica*, adenovirus, and corona virus, but positive for distemper and parainfluenza. However, this particular dog had received a modified live Da2PP vaccine within the preceding two weeks, and Bobbi had been correctly informed that the sensitive PCR test could be detecting the vaccine rather

than actual infection. These tests must be interpreted carefully, as positive results are not always indicative of the cause of an illness. Confirming a diagnosis at this point was critical, not only for treating the affected dogs, but also for strategizing to prevent further disease spread.

Diagnosis Dilemmas

Everyone, including myself, was worried. While a definitive diagnosis was pursued, the shelter put steps in place to ensure that the disease was contained and further transmission stopped. Although this sounds simple, enacting any type of effective quarantine requires tremendous staff effort.

Bobbi and I talked over the two most likely rule-outs for the clinical signs she was observing in her shelter, with the understanding that many agents of canine infectious respiratory disease can cause similar clinical signs—and sometimes there can be more than one infectious agent present at a time. With a recent case of possible canine distemper virus, transport occurring

from many areas of the country, and a high percentage of dogs showing clinical signs and some showing pneumonia, CDV was high on the list of possibilities. However, pre-death diagnosis of distemper is, unfortunately, not a simple undertaking. Although there are many tests for distemper available, they all require interpretation. Recent vaccination (within approximately one to three weeks) can interfere with most test results, including serology, immunofluorescent antibody testing, and PCR, creating confusion in shelters where vaccination on intake is standard practice.

We also discussed canine influenza virus (CIV) as another rule-out. Several of the dogs seemed to have had repeated bouts of illness, which is typically not the case with CIV. Because testing for CIV is a little more straightforward, the decision was made to run serum antibody titers and nasal swab PCR tests on 12 dogs with varying clinical signs and shelter intake dates in order to attempt to rule CIV in or out. (For more information on testing methods, read the Mar-Apr 2010

Animal Sheltering article, “Canine Influenza Virus: Fact or Fiction?” and the chapter on canine influenza in the new textbook *Infectious Disease Management in Animal Shelters*.) All dogs tested negative for canine influenza virus both via PCR and serology, making this disease a very low likelihood as the cause of the outbreak.

At this time, two dogs started to show neurological signs—a classic symptom associated with CDV. Euthanasia was elected due to poor prognosis, and distemper was quickly confirmed through a necropsy at the state laboratory. Had these dogs not developed obvious distemper signs, further testing would have been required to properly determine management steps, as there are many other infectious agents that can cause canine infectious upper respiratory disease. In many shelter outbreak situations, animals euthanized due to illness provide ample opportunity for necropsies to be performed. It’s an opportunity that’s frequently overlooked and is generally one of the fastest and most economical means to



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Bobbi Allen



Miranda Spindel

direct treatment and management steps that can save other lives.

With the diagnosis of distemper now certain, Bobbi and I were able to discuss options for how the shelter should manage the outbreak.

The Shelter Perspective: Bobbi Allen

When Dr. Spindel and I first spoke, she explained to me the importance of isolation to mitigate the spread of disease. We were operating as usual and did not realize that some common practices—in conjunction with the layout of the building—were contributing to transmission of respiratory disease among the dogs.

Despite being a well-used, aging building, our shelter has many great features, and our experienced management team and staff have developed some good protocols and standard operating procedures. However, when faced with this disease outbreak, we

took a step back to evaluate the flow of both human and animal traffic in the building. We realized that our situation and some of our practices were less than ideal.

Given our current facility, true isolation or quarantine is virtually impossible for us in our daily operations as a busy open-admission shelter. Because most canine respiratory agents transmit through direct contact, through fomites (surfaces that can carry disease agents), and through the air with relative ease, Dr. Spindel recommended that we separate all of the dogs in the building (both exposed and sick) from any new dogs coming in. She also suggested to further separate symptomatic dogs. Some shelters, she explained, can do this by simply halting admissions. In other shelters, that's not an option, and creative use of space can allow a break between incoming and existing populations. Some facilities even use an off-site building for intake.

We decided the best plan for our shelter was to stop accepting owner-relinquishments and halt dog adoptions while diagnostics took place. Our shelter has contractual arrangements, and a clean area was set up for new stray animals to be received and handled separately from the exposed population.

After two weeks, the diagnosis of canine distemper virus was confirmed, and the shelter management pulled together to discuss the options. We talked about how long the exposed and sick dogs would need to stay separated based on incubation and shedding periods. The unfortunate aspect of distemper is that it has a lengthy incubation time (weeks to months) and a lengthy shedding period (two to three months), and some animals can be infectious without obvious clinical signs. We were basically faced with two choices: strict isolation of the sick and exposed dogs for the 90-day period required to ensure dogs are no longer incubating or shedding virus, or total de-population. Euthanasia of our entire dog population was not something we were willing to consider.

Splendid Isolation

We made a plan to seal off a kennel room that houses 23 kennels to give us the space needed to isolate nearly 30 dogs. An existing exterior door was modified to accommodate staff entrance only from the outside. The area

was stocked with all the supplies needed for daily enrichment, sanitation, feeding, medical treatments, first aid, etc. We prepped the room to exist as a stand-alone operation that would be staffed by two employees all day for 90 days; these employees were not permitted access to the rest of the shelter after beginning their shifts. All dogs who exhibited symptoms of illness were moved to this area. We literally locked the door that connected the area to the rest of the shelter building and put up a plywood wall to prevent any possibility of accidental exposure.

The remaining dogs underwent bedside distemper antibody testing to establish whether individual dogs were at a high or low risk for infection. Titer testing is a somewhat experimental method of management in a shelter outbreak situation. In our shelter, all asymptomatic dogs with positive titers (indicating a low risk for CDV because they were likely to have strong immunity) remained in the adoption section. The one dog with a low titer result (and therefore a high risk for infection) was relocated to isolation.

After the move was complete, we spent two whole days rigorously cleaning and disinfecting the building. While the virus cannot survive long-term outside a host, we had to be vigilant to eradicate any possibility for new animals to be exposed. On the third day, we reopened to the public for dog adoptions and relinquishments.

For the first six weeks after reopening, we drew blood on each incoming dog the moment she came through our doors to measure distemper antibody levels, then vaccinated against DA2PP and *Bordetella bronchiseptica* as part of an established routine protocol. We titer-tested these dogs because we wanted information about their immunity to distemper on intake. We hoped that this information might allow us to diagnose disease and decide on a plan of action should any sickness appear in the new population.

One discovery that was particularly alarming was the evidence of unprotected and under-vaccinated dogs. About half of the local dog population that came in during this time did not have sufficient antibodies on the titer test to be considered protected. We were fortunate that not one dog fell ill after the initiation of quarantine.

Clear Communications

We decided right from the beginning to let the public know about what was happening via press releases and the Internet and to provide frequent, factual, non-alarming updates. Our honesty and openness were key in maintaining the public's trust, gaining support, and generating adoption interest. Our careful approach enforced the fact that we are a competent group of animal care professionals who are caring for homeless animals. We are extremely fortunate to have the resources and support that we have. Our donors, volunteers, colleagues, local veterinarians, and the public all stood behind our efforts to successfully care for these dogs.

Our dedicated and enthusiastic staff were determined to create an environment where the isolated dogs would thrive, with a goal of releasing for adoption those dogs who were behaviorally better than when they went in. Daily obedience training, scheduled rest time, play groups, indoor agility, treat puzzles, and quiet one-on-one time in the kennels for 90 consecutive days produced a

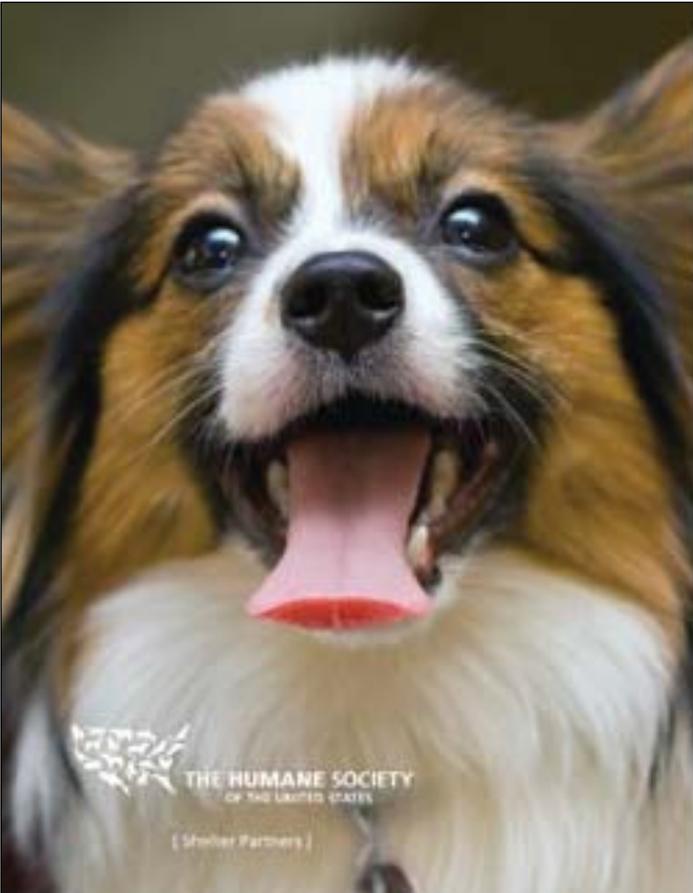
mish-mash group of highly desirable adoption candidates.

The final release of quarantine was a day of celebration and lots of wonderful adoptions. Fifteen dogs went home on that first day! One dog went to Massachusetts, to a new owner who had been following the story on our website and was excited to adopt a dog who had undergone the training we had invested in the dogs to keep them healthy and sound. All of the quarantined dogs found new homes within a short period.

While operations at the Animal Welfare Society are back to normal now, managing this outbreak highlighted some important lessons, both from a management and a veterinary perspective. No shelter is immune to viral disease outbreaks, and an outbreak of a disease like distemper is a lot of work to manage! Not every shelter would be able to successfully complete a distemper quarantine, not just because of physical building limitations, but because maintaining animals' behavioral well-being during this time requires creativity and dedication.

The Animal Welfare Society is now operating with a heightened awareness of the general health of residents, tighter transfer dog protocols, and is quick to perform diagnostic testing (up to a necropsy) in the event of illness. Shelters need to know that there are resources available and should feel comfortable asking for help if animals are not responding to typical treatments, are dying, or if a large percentage of the population is ill. The earlier that diagnosis and management steps can be implemented, the better off a shelter and an entire community will be.

The outbreak at the Animal Welfare Society serves as an important reminder of the vital role that shelters play as sentinels and educators for the community—and not just in cases of disease. While canine distemper virus is almost entirely preventable through good vaccination programs, it is a disease that is still circulating in the dog population. Ultimately, learning to reduce any infectious disease in an animal shelter will result in more healthy animals finding lifelong homes. **AS**



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