2015 Canine Influenza Virus Outbreak – A Case Study

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Beginning in mid-March 2015, Chicago-area veterinarians began noticing a sharp increase in the number of coughing dogs presenting to their facilities. According to the Chicago Veterinary Medical Association, more than 1,000 dogs were afflicted in the first two weeks. Clinical signs such as persistent cough, inappetence and in some cases, fever and vomiting – and the history of the affected dogs being in social settings like dog parks, daycares and boarding facilities – initially pointed to Bordetella. Commonly referred to as kennel cough, Bordetella is a bacterium that is one of several pathogens found in the Canine Infectious Respiratory Disease Complex (CIRDC).

“At first, we tried to understand why some of the dogs that seemed to have kennel cough were getting really sick,” says Dr. Anne Cohen, a board-eligible critical care specialist at the Chicago Veterinary Emergency & Specialty Center. “My first case involved a dog with a fever of 105. This was not the normal presentation of Bordetella.”

Most of the initial diagnostics submitted were negative for all pathogens or inconclusive. Dr. Denise Chow of Family Pet Animal Hospital in Chicago reported that during this time, her clinic identified two cases of adenovirus 2, another CIRDC pathogen.

In support of the veterinary community, Merck Animal Health began contacting Chicago-area veterinary clinics in affected areas and sponsoring respiratory panel testing. The testing was conducted at the Cornell University Veterinary Diagnostic Laboratory under the guidance of Dr. Ed Dubovi.

Between March 16, 2015, and April 23, 2015, Cornell performed diagnostic testing on more than 350 samples of nasal and pharyngeal swabs to determine the causative pathogens. The screening panel included polymerase chain reaction checks for Bordetella, adenovirus 2, canine distemper, canine influenza virus (CIV), parainfluenza virus, pneumovirus and respiratory coronavirus – all CIRDC pathogens.

More than 200 samples tested positive for CIV. Initially, the disease was thought to be canine influenza H3N8, an infectious respiratory disease of dogs that was first isolated in Florida in 2004. The H3N8 virus has been found in more than 40 states and is considered endemic in
Pennsylvania, New York, New Jersey and Colorado. However, further investigation led Cornell researchers to believe a new strain was involved. Subsequent testing, carried out with the assistance of the Wisconsin Veterinary Diagnostic Laboratory, identified the new subtype as canine influenza H3N2.

On April 9, scientists at the National Veterinary Services Laboratories in Ames, Iowa, completed genome sequencing on the virus, and confirmed it to be Asian H3N2. All eight genome segments of the virus match closely (99 percent identity) with viruses isolated from dogs and cats from South Korea. “It’s absolutely certain that the virus came from South Korea,” says Dr. Dubovi. It’s the first reported incidence of H3N2 in the United States.

“It seems to be a bit more pathogenic than the U.S. variant. My guess is H3N2 produces 10 times more virus; the rate of spread suggests that’s the case,” Dr. Dubovi adds. “So there’s a higher probability that it might not burn itself out as quickly because it’s more easily transmissible.”

A 2013 study of the canine influenza H3N2 virus in pet dogs in South Korea noted that the dogs showed severe respiratory signs and other clinical symptoms such as fever, reduced body weight and interstitial pneumonia. While there is no evidence H3N2 can be transmitted to humans, it has caused infection and illness in cats. There have been no reports in the United States of cats contracting H3N2.

Despite the obvious CIV outbreak, other CIRDC pathogens also were found in the Cornell diagnostic testing but at a much lower rate. Twenty-four of the dogs were positive for parainfluenza virus; all but two had confirmed histories of annual vaccinations with distemper, adenovirus type 2, parvovirus and parainfluenza virus injectable vaccines. This suggests that regular vaccinations with injectable combination products may not protect dogs sufficiently against respiratory parainfluenza infections. Thirteen of the 24 also had received Bordetella-only vaccines. Five of the 24 dogs received a Bordetella, adenovirus and parainfluenza combination intranasal vaccine, but four of those had been vaccinated within two weeks, which may have resulted in false positives. Other CIRDC-related pathogens found during testing included three adenovirus, nine Bordetella, 27 pneumovirus and 29 coronavirus cases. At this time, there are no commercially available vaccinations for pneumovirus or coronavirus.

**CIV: What to watch for**

“All dogs are at risk – large and small, young and old,” says Dr. David Gonsky, founder and director of Chicago’s West Loop Veterinary Care, one of the first clinics to see a large number of canine influenza virus cases. “Many of the dogs I was seeing presented with a cough but quickly became significantly more ill, showing signs of lethargy, decreased appetite, high fever and other symptoms.”
According to Dr. Natalie Marks of Chicago’s Blum Animal Hospital, “With the influenza positives we’ve had, we’ve seen a fever of 104 or 105, a guttural, hacking cough, a quick loss of appetite, and sometimes vomiting. This all happens fast, one to three days after exposure to the virus.”

At the Animal Ark Veterinary Clinic in Chicago, “We’re seeing a high percentage of dogs that are exposed to canine influenza becoming infected,” says Dr. Derrick Landini, who also serves on the board of directors for Chicago Veterinary Emergency & Specialty Center. “Thankfully, only a small number of these cases are progressing to pneumonia.”

Despite treatment, six dogs in the Chicago outbreak have succumbed, including two patients of Dr. Cohen and two patients of Blum Animal Hospital at the emergency clinic. The necropsy report for both Dr. Cohen’s cases confirmed H3N2. The histopathology reports showed widespread, severe damage to the lung tissue and interstitial hemorrhagic pneumonia. Areas of necrosis in the lung tissue also were noted.

Anatomy of an outbreak

Although the first case was confirmed in Darien, Illinois, the heart of the outbreak likely started in affluent areas near downtown Chicago. It has since been confirmed in the suburbs in Naperville, South Elgin, Oswego, Riverwoods, Hoffman Estates, Wheaton and Northbrook. There also are three confirmed cases in Indiana, and the University of Wisconsin has confirmed positives in Dane County, Wisconsin.

Compared to an earlier Chicago outbreak of CIV H3N8 in 2008, Dr. Landini believes this one is taking much longer to control. “We also have more dog parks, boarding facilities and daycares in this area than we had seven years ago.”

Dr. Marks says they didn’t have a single positive case during the 2008 outbreak, but that has all changed with the current situation. “We’re an eight-doctor, urban, high-volume practice, and this time we’re seeing 15 to 20 cases a day. It has been a nightmare, and I’m afraid it could become worse. But many daycare and boarding facilities already have temporarily closed to help stop the spread.”

Precautions at veterinary facilities

The influenza virus can live on soft surfaces such as clothing for 24 hours, and 48 hours on hard surfaces.² It can be spread by direct contact with respiratory secretions from infected dogs, through the air via a cough or sneeze, and by contact with contaminated objects such as dog bowls, toys and clothing. Clothing, equipment, surfaces and hands should be cleaned and disinfected after exposure to dogs showing signs of respiratory disease.
Dr. Cohen urges veterinary health professionals in the surrounding areas to be prepared. “This virus is very contagious and all it takes is one coughing dog in the waiting room. We have an effective process for isolation and sanitation in our facility. We have signs on every door asking pet owners to call us on the phone to let us know they have arrived. This keeps contagious dogs out of the waiting room until we are ready to see them. Instead, we send our veterinary technicians out to the car in full protective gear – wearing a gown, mask, booties and gloves – to handle basic triage. This helps minimize the spread of the disease.

“The technician will then bring the animal into a specific room that is designated for treatment of this illness. The exam room is cleaned thoroughly and disinfected with a bleach solution before and after the visit. The dog stays in this room during the examination,” says Dr. Cohen. “Afterward, the dog is taken directly back to the owner’s car.”

The clinic’s protocol includes constant cleaning and disinfecting. “Our staff cleans everything between visits with a bleach solution – the walls, floors, tables, stethoscopes, anywhere the client and patient were sitting,” Dr. Cohen explains. “The room is then allowed to ‘air out’ for at least 10 minutes before the next case is brought in. This helps assure that it is properly sanitized.”

Tips for controlling the spread of CIRDC pathogens in a veterinary facility can be found at www.doginfluenza.com.

Other lessons from the front lines

“It took a couple of days to realize that we weren’t dealing with kennel cough,” says Dr. Gonsky. “Once we realized it was more severe, many of us worked together with Cornell and Merck to try to quickly find answers and solutions.” Dr. Gonsky and other Chicago veterinarians have been working hard to make the public – including local businesses such as dog daycares, boarders, dog walkers, groomers and pet sitters – aware of CIV.

After doing several media interviews, Dr. Marks and her staff proactively reached out to daycares, kennels and groomers to provide knowledge and to act as a resource during the outbreak. However, others in the media were suggesting that these small businesses may be unintentionally spreading the virus and encouraged them to close temporarily, and Dr. Marks has fielded a few angry phone calls. “Two of the six dogs in Chicago that died were our clients. They were young dogs that went to daycare.” Dr. Marks also reached out to the dog walking community to help offer guidance for disinfection guidelines and to educate about how long the virus lives on clothing and hard surfaces.

Dr. Cohen points to examples where the dogs haven’t been boarded or gone to daycare, but live in a large condominium or apartment building and simply walk the same hallways as dogs that have been exposed.
Prevention of CIV

Merck Animal Health introduced a canine influenza vaccine in 2009, Nobivac® Canine Influenza H3N8. This vaccine has been proven to provide protection against the H3N8 strain of the virus. Vaccines may provide a certain amount of cross-protection against different strains of the same virus; however, it is not known if the current vaccine will provide any protection against H3N2. Testing currently is underway to determine if cross-protection is possible with Nobivac Canine Influenza, but this process will take time.

Merck Animal Health has reviewed case details that had been submitted to Cornell for testing. To date, all of the 200+ dogs that tested positive for CIV in this sampling did not have a history of canine influenza vaccination. In addition, one dog that was vaccinated in August 2014 with an initial vaccine and a booster of canine influenza H3N8 tested positive for parainfluenza but negative for CIV. Dr. Gonsky says, “We are hoping the H3N8 vaccine is able to give us some protection and this goes away.”

Viral diseases are best prevented by vaccination, especially for social dogs that are frequently in contact with other dogs. “I think canine influenza virus will probably be a regional core vaccine after this outbreak,” says Dr. Marks.

Spreading the word about CIV

To help Chicago-area veterinarians and pet owners better understand and prevent CIV, Merck Animal Health has been updating veterinary clinics and veterinary organizations as new information is received. Merck technical service veterinarians have been collaborating with the Chicago veterinary community on media interviews to help educate the public; offering a veterinary webinar with Dr. Dubovi, PhD (Director Virology Laboratory, Animal Health Diagnostic Center, College of Veterinary Medicine, Cornell University) and Dr. Justine Lee, DVM, DACVECC, DABT (Founder of VetGirl) discussing the CIV problem and treatment options; and providing recommendations and tips that veterinarians can share with clients.

For example, dogs that have had a recent respiratory infection should be kept at home for about two weeks to allow the dog to recover fully and minimize the risk of spreading the infection. Food, water bowls and toys should be cleaned routinely. Daycares and boarding facilities should have a plan for isolating dogs with signs of respiratory illness, and protocols in place to prevent the spread of CIV.

Dr. Gonsky also has enlisted the help of local businesses. “We’ve done a lot of educational pieces and newsletters for clients, local boarding businesses and even apartment buildings to get the word out. We encourage everyone to forward information to their clients and friends. We did media interviews, created Facebook posts and did everything we could think of.
to spread the word. And if we had a request for a media interview that we couldn’t handle, we gladly referred them to other veterinarians. We just want to educate pet owners about the danger of this disease.”

Dr. Marks has been emailing to stay in touch with her clients as well. She recommends that they bring dogs in immediately if they start coughing. “The period of highest shedding is close to the time when the dog starts coughing,” she says. She also urges fellow veterinarians to perform diagnostic testing to identify the pathogen. “Surveillance of the virus will help us know where it’s going.

“During the first few days of the outbreak, we didn’t understand how contagious this virus really is,” Marks adds. “I encourage veterinary clinics to step up their isolation protocols to help decrease the virus spreading to healthy dogs.”

1 Kang et al., H3N2 Canine Influenza Virus Causes Severe Morbidity in Dogs with Induction of Genes Related to Inflammation and Apoptosis, Veterinary Research, 2013:44:92.