Canine influenza disease information, tips, and guidelines for clinics and pet owners
CIRD is a multifactorial disease complex that can be caused by a variety of pathogens ¹⁻⁵

- *Bordetella bronchiseptica* (*Bb*) is a common pathogen
- Other pathogens have been identified as playing a role in CIRD, including viruses, mycoplasma, and bacteria other than *Bb*
- Environmental and host-related factors can also contribute to disease

**LITTLE WARNING**

- Infected animals can be contagious *before* they develop clinical signs ⁶
- A subclinical carrier state may also exist, further compounding the problem
- For vaccine-preventable conditions, there likely will not be opportunity to vaccinate in the face of an outbreak
CIV is a highly contagious and emerging viral pathogen in the CIRD disease complex.

- Virtually all dogs are susceptible to CIV regardless of breed or age.
- Infection rates of 60% to 80% are not unusual.

CIV is now considered endemic in the US canine population.

Seropositive States:
- CIV H3N8 and CIV H3N2 positive cases
- CIV H3N2 positive cases
- CIV H3N8 positive cases
- No positive tests reported

These data are compiled from publicly-available information furnished by Idexx, Antech, WebMD, and Cornell University and from information collected in connection with the Zoetis Petcare Immunization Support Guarantee (ISG) program.
Potential risks of a CIV outbreak to canine patients, boarders, and your practice

- The hospital’s reputation can be at stake
- Boarding may be closed from days to weeks
- Waiving various fees and product charges

Prepare a CIV Outbreak Management Plan

1. Establish a chain of communication from the clinic to the community:
   - How will the clinic communicate with their clients?
   - What information should be conveyed to clients and the community?

2. Educate staff and volunteers about CIV signs and risk factors:
   - Train staff to be alert to signs of respiratory infection
   - Provide written and oral instructions for all staff members and volunteers to ensure a consistent response if they notice signs of respiratory disease

3. Quarantine high-risk dogs for 1 week and isolate all dogs showing clinical signs of respiratory infection:
   - Mildly affected dogs may transmit severe disease to others
   - Clean and disinfect contaminated clothing, hands, equipment, and surfaces after exposure to dogs with respiratory disease, a history of boarding, or recent transfer from high-risk areas

4. Ensure animals are appropriately vaccinated for CPiV, CAV-2, CDV, CIV, and Bordetella bronchiseptica on intake

5. Clean and disinfect areas which have contact with large numbers of animals, such as obedience classes or in clinics:
   - Make sure employees wash hands and change clothing after caring for hospitalized animals
Careful and effective cleaning by well-trained employees is mandatory for CIV control\(^6,\text{13}\)

- Time and money spent on training and supplies for an effective cleaning program will result in decreased costs due to disease

### DAILY CLEANING REGIMEN
- Food and water bowls
- Automatic waterers
- Hallways
- Toys
- Animal transport vehicles

### DISINFECTION PROTOCOL
- Runs
- Cages and carriers
- Walkways
- Doorknobs
- Exam tables

#### ORDER OF CLEANING PRIORITY\(^6\)

- **PUPPIES** in general kennel
- **ADULTS** in general kennel
- **PUPPIES** in quarantine
- **ADULTS** in quarantine
- **ISOLATED** animals

Most vulnerable animals

Cleanest areas

Least vulnerable animals

Most contaminated areas

#### Cleaning products and equipment\(^6,\text{13}\)

- Clean with a detergent-based product first, then disinfect with bleach (5% NaClO diluted at 1:32 or 1/2 cup/gal), Virkon\(^\text{®}\), Trifectant\(^\text{®}\), or Accel\(^\text{®}\)

- Allow 10 minutes contact time for disinfectants, followed by thorough drying

- Surfaces contaminated with feces, urine, vomit, blood, or nasal discharge must first be cleaned with detergent and rinsed before using disinfectant

- More disinfectant is not better! Overly concentrated disinfectant solutions are damaging to skin, eyes, and respiratory tract, and can worsen disease due to tissue irritation

- Dedicate separate cleaning supplies, rubber boots, and disposable gowns to each area

- After handling any dog, disinfect hands with 15-20 seconds of thorough handwashing with soap and water

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‘All CIRD pathogens can cause similar clinical signs during the first week of illness’ 6

- Cannot be diagnosed based solely on clinical signs
- Accumulating evidence indicates that many respiratory infections in dogs are viral

CIV is contagious before clinical signs develop 7

- Samples collected during exam may not identify CIV
  - H3N8: clinical signs may emerge after virus shedding
  - H3N2: data not yet available

Diagnostic tests: CIV or other CIRD pathogens? 6,14

When an outbreak situation is suspected, a minimum of 3 to 5 dogs (or 10-30% of the affected population) should be tested

CONJUNCTIVAL, NASAL, AND PHARYNGEAL SWABS FOR VIRUS ISOLATION
- Dogs showing clinical signs for <4 days should be sampled, to catch the pathogens in their peak shedding period

PCR
- Most sensitive early in outbreak
- False negatives occur after onset of clinical signs
- Depending on the pathogen, a positive PCR result does NOT necessarily mean that pathogen caused the disease; instead, look for patterns of frequently isolated pathogens in a group of infected dogs

PAIRED SERUM FOR HEMAGGLUTINATION INHIBITION (HI) ASSAY
- Acute and convalescent: 1 to 3 weeks apart
- 4-fold increase typically indicates recent infection

CIV PROGRESSION 12

Incubation period
- 2-5 days from exposure to onset of clinical signs
- Shorter than many other CIRD pathogens

Peak viral shedding
- 2-4 days post-infection
- Dogs may be most infectious prior to showing signs of disease

Viral shedding
- For 7 days post-infection

Carrier state
- No true carrier state
- Some dogs may be subclinically infected
At the time a case of CIV is identified, all dogs in the hospital should be considered exposed.\(^6,15\)

- These dogs should be considered to pose an infectious risk for at least 7 to 10 days and should be quarantined from unexposed dogs for 3 weeks
- Consider closing the hospital to any further intake during an outbreak

**TRANSMISSION OF CIV**

**Airborne**
- CIV can be distributed over distances >20 feet in aerosols generated by sneezing and coughing, potentially causing rapid transmission throughout a kennel

**Direct Contact**
- Anywhere pets are gathered: dog parks, day care, groomers, etc

**Contaminated Objects**
- Surfaces, clothing, food, waterbowls, etc

**QUARANTINE AND ISOLATION**

STOP THE SPREAD OF CIV

**Steps for effective quarantine and isolation**

- Separate area for un-exposed dogs, ideally separate ventilation
  - **Hospitals with two wards:** collect all exposed dogs into one ward and take in other non-affected animals into the second ward
  - **Hospitals with a single ward:** delay hospitalization, divert non-affected animals to another facility, or send exposed dogs off site
- Do not release exposed dogs until after 3-week quarantine
  - May release to homes with no other household dogs, with stipulation that dogs not be taken out in public for 3 weeks
- Allow only designated staff to enter quarantine/isolation areas
  - Separate jumpsuits (full clothing coverage), gloves, masks, boots or shoe covers, cleaning, feeding, and treatment supplies
  - Foot baths not very effective, may provide false sense of security
- Ventilation should be as separate as possible
  - Designated area within a common air space may not be sufficient
  - At the minimum, separate by full wall and door
**There is no single ‘drug of choice’ for treatment of canine influenza or CIRD**¹³⁻¹⁷

- CIRD has many causes, including viral and bacterial pathogens
  - Treatment is based on diagnostic results, clinical signs, and vaccination history
- In most cases, treatment mainly involves **supportive care** and is limited by the health of the dog
- Antibiotic treatment may be used for dogs with evidence of bacterial disease or risk for secondary bacterial infection
  - Antibiotic efficacy against these pathogens can be unreliable
- Steroids, antitussives, and bronchodilators have been reported for treatment of clinical signs, but with mixed results

**The best protection is vaccination against CIV and other CIRD pathogens**

Safe and effective vaccinations are available for:
- *Bordetella bronchiseptica*
- Canine parainfluenza virus (CPiV)
- Canine adenovirus 2 (CAV-2)
- Canine distemper virus (CDV)
- Canine influenza virus (CIV)
Should you vaccinate against CIV?

- Always consult with your veterinarian for specific considerations regarding your pet

<table>
<thead>
<tr>
<th>VACCINATION CONSIDERATIONS</th>
<th>PUPPIES</th>
<th>FAMILY &amp; OR BACKYARD DOGS</th>
<th>DOGS ENTERING A BOARDING KENNEL</th>
<th>DOGS IN ANIMAL SHELTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are these pets healthy?</td>
<td>Not always</td>
<td>Often</td>
<td>Often</td>
<td>Not always</td>
</tr>
<tr>
<td>Is their environment hygienic?</td>
<td>Not always</td>
<td>Often</td>
<td>Not always</td>
<td>Not always</td>
</tr>
<tr>
<td>Are the animals stressed?</td>
<td>Often</td>
<td>No</td>
<td>Often</td>
<td>Often</td>
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</tbody>
</table>

Consider vaccinating dogs that are traveling to high-risk areas⁷⁻¹¹

- Dogs that travel to areas where CIV has been reported can be at risk
- 42 states have reported cases of CIV caused by H3N2, H3N8, or both
Efficacy: Vanguard CIV H3N2/H3N8 vaccine against heterologous CIV H3N2 challenge

40 Dogs were exposed to CIV H3N2 – 20 dogs were vaccinated with Vanguard CIV H3N2/H2N8, and 20 dogs were placebo vaccinated

**SHEDDING OF CIV H3N2 AFTER CHALLENGE**
- Vaccinates Averaged: **1.3 Days**
- Controls Averaged: **4.9 Days**

**VIRUS ISOLATION FROM LUNG LAVAGE AND TISSUE AFTER CIV H3N2 CHALLENGE**
- CIV H3N2 was not isolated from lung lavage fluid or tissues in any of the vaccinated dogs. Sixty percent of the control group had CIV H3N2 isolated from tissue and/or lavage fluid

**CIV H3N2 AND H3N8 ANTIBODY TITERS BY HEMAGGLUTINATION INHIBITION (HAI)**
- All vaccinates had detectable titers to CIV H3N2 and CIV H3N8 by Day 21 when the second vaccination was administered

Safety: 364 dogs were included in the study, no significant adverse events attributable to vaccination were reported

* Backed by Zoetis Petcare Immunization Support Guarantee (ISG)
** Revaccination information based upon Docket APHIS-2011-0049
Vanguard® CIV H3N2

- Killed whole virus vaccine strain: A/canine/Illinois/12191/2015

**STRAIN INFORMATION**

**CIV H3N2**
- Virus of avian origin
- First detected in South Korean dogs in 2007
- First reported US cases in a Chicago CIRD outbreak in early 2015. Outbreaks have been occurring since that time

**ADMINISTRATION & USAGE**

Vanguard® CIV H3N2
- For healthy dogs 8 weeks of age and older
- 2 doses, 3 weeks apart
- Annual revaccination with single dose recommended
- 25x1 dose packages

**CIV H3N8: demonstrated protection against canine influenza H3N8**

- Killed whole-virus vaccine (H3N8), Iowa 05 strain

**STRAIN INFORMATION**

**CIV H3N8**
- First described in racing greyhounds in 2004
- Original outbreak was severe, relatively high mortality
- Today, typical infection is less severe and likely to result in tracheobronchitis

**ADMINISTRATION & USAGE**

Vanguard® CIV H3N8
- For healthy dogs 8 weeks of age and older
- 2 doses, 3 weeks apart
- Annual revaccination with single dose recommended
- 25x1 dose packages

**CIV H3N2 PROTECTION**

**VANGUARD® CIV H3N2**

**CIV H3N8 PROTECTION**

**VANGUARD® CIV H3N8**

**Safety and efficacy demonstrated against heterologous CIV H3N8 challenge**

**REDUCED CLINICAL SIGNS**
- Cough: ~85% reduction vs. non-vaccinated dogs
- Ocular discharge: ~58% reduction vs. non-vaccinated dogs

**SIGNIFICANTLY REDUCED VIRAL SHEDDING**
- ~92% reduction in shedding vs. non-vaccinated dogs ($P < 0.0001$)

**SIGNIFICANTLY REDUCED LUNG CONSOLIDATION**
- ~47% reduction in total consolidation vs. non-vaccinated dogs ($P = 0.0238$)

**DEMONSTRATED SAFETY PROFILE**
- In a field safety study involving 691 dogs, no significant adverse events were observed
The Zoetis family of CIRD vaccines

**VANGUARD® B ORAL**
For vaccination of healthy dogs at 8 weeks of age or older as an aid in preventing canine infectious tracheobronchitis (Kennel Cough) caused by Bordetella bronchiseptica

**VANGUARD® B (INTRANASAL)**
• For primary vaccination against Bordetella bronchiseptica in puppies as young as 3 weeks of age

**BRONCHICINE® CAe (INJECTABLE)**
• For primary vaccination against Bordetella bronchiseptica

**VANGUARD® CIV H3N2/H3N8**
• For vaccination against CIV H3N8/H3N2

**VANGUARD® CIV H3N8**
• For vaccination against CIV H3N8

**VANGUARD® PLUS 5**
• Protection against canine parainfluenza virus (CPIV), canine adenovirus 2 (CAV-2), canine distemper virus (CDV) and canine parvovirus (CPV)

**VANGUARD® RAPID RESP 3 INTRANASAL**
• For vaccination of healthy dogs at 8 weeks of age or older as an aid in preventing respiratory disease caused by canine adenovirus Type 2 (CAV-2), canine parainfluenza caused by canine parainfluenza virus (CPIV), and disease caused by Bordetella bronchiseptica (Bb). Also available in bivalent (Bb, CPIV) and monovalent (Bb) options.

Protection beyond the vaccine

• The Petcare Immunization Support Guarantee (ISG) covers diagnostics to establish whether a pet vaccinated with one of the Zoetis vaccine antigens* has contracted the corresponding disease

• If the diagnostics confirm the corresponding disease, the Petcare Immunization Support Guarantee* (ISG) will cover physical examination, ancillary diagnostic and therapeutic charges up to a maximum of $5,000 for any CIRD product and up to $7,500 for Bb Prime-Boost

• It includes coverage for up to four years on core antigens and up to one year on most non-core antigens*

*All petcare vaccines are covered with the exception of all Defender® and Felocell® FIP products.

9. Map produced using data made available to Zoetis (Study No. BLDR 40813) and updated in 2014. Data were not obtained from all national and regional veterinary laboratories. The actual percentages of actual cases captured in this map are unknown and could represent a fraction of confirmed CIV cases.
22. Data on File. Study Report No. 3161R-60-09-383, Zoets LLC.

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