

Kennel cough: Canine Infectious Respiratory Disease Complex (CIRDC)

The following terms are usually used interchangeably for CIRDC:

- Kennel cough
- Infectious tracheobronchitis
- Canine infectious respiratory disease

Viral and bacterial pathogens associated with CIRDC include (but are not limited to):

- Parainfluenza virus
- Adenovirus
- Canine respiratory coronavirus
- Canine herpesvirus
- Canine distemper virus
- Canine influenza virus

- *Bordetella bronchiseptica*
- *Mycoplasma spp.*
- *Streptococcus zooepidemicus*

We are still unraveling the complicated causes of CIRDC, several pathogens have only been recognized in recent years, and it is likely that new pathogens will be discovered. Another complicating factor is the possibility for secondary bacterial infections that can result in uncharacteristic and severe disease.

Not just germs....

When dealing with CIRDC we are not just dealing with germs, *environmental factors and host immune response play an equally important role in this disease complex*. There's a reason it's called "kennel cough" – several of the pathogens listed above will usually not cause disease on their own but are dependent on additional stress, high contact rate, and other factors associated with kenneling. In this lecture we will focus not so much on how to treat CIRDC, but how we, in a shelter setting, can prevent the development of CIRDC. Since CIRDC is a complex disease; our prevention strategies for prevention need to be complex as well. We rely both on supporting the animal's ability to ward off disease as well as reducing the level of environmental contamination.

Who is susceptible to CIRDC?

All dogs are susceptible to some degree, but unvaccinated, immune compromised and young animals are especially vulnerable.

Not just dogs....both cats and immune compromised humans can get infected, at least in respect to *Bordetella* infection. So to prevent cross-species transmission as well as reduce stress for all concerned, it is always ideal to house ill animals separately by species.

Prevention of CIRDC:

- **Reduction of crowding and stress**

Crowding and the resulting stress is undoubtedly the single greatest risk factor for severe respiratory disease outbreaks in shelter animals', as well as for other diseases (i.e. parvo).

Increased population density leads to a greater risk of disease introduction, higher contact rate, reduced air quality, and often, compromises in housing and husbandry. Crowding is not uncommon, and may

have different reasons including insufficient facilities to provide even minimal care for the stray population, and well-intended attempts to decrease euthanasia by housing more animals. Tragically, we have seen in several cases that such efforts may not only fail to improve the number of animals adopted, they may actually lead to increased disease and death.

Signs of crowding in a shelter:

- Housing dogs in each side of a double-sided cage intended for a single dog
- Housing multiple unrelated dogs per cage (particularly if not done in “all in/all out” fashion)
- Failure to isolate symptomatic animals
- Delays in moving animals through the facility

An underappreciated strategy for CIRDC prevention is to simply reduce the amount of time dogs spend in the shelter environment. One study showed that each day in a shelter increased the risk of CIRDC by 3%. Increased time for each dog in the shelter also contributes to increased crowding with all its associated risks.

- **Vaccination**

Unfortunately CIRDC is not entirely vaccine preventable: some vaccines only provide partial protection at best, for some of the contributory or primary pathogens there is no vaccine available, and it is not always possible to vaccinate all animals prior to exposure in a shelter environment.

This does NOT, however, mean that vaccinations are not important in controlling CIRDC: in some cases disease can be virtually entirely prevented (i.e. canine distemper virus), while in others frequency and severity can be significantly reduced.

- ALL dogs should receive a modified live (MLV) or recombinant subcutaneous vaccine containing distemper (DHPP or DA2PP) **immediately** upon intake to a shelter (if not sooner).
- Puppies should be vaccinated starting at 4 – 6 weeks of age, and revaccinated every 2-3 weeks until 16-18 weeks of age. The younger end of the age range and shorter revaccination interval should be used in high risk environments (shelters).
- An additional intranasal vaccination is recommended for Bordetella due to the rapid onset of immunity (3-5 days) and production of local protection in the nasal mucosa. This vaccine can be used in puppies as young as 2-3 weeks of age, and may provide local immunity even in the face of maternal antibody.

- **Environmental decontamination**

Most CIRDC pathogens do not survive in the environment for a long time. Distemper will only survive for a few hours, while Bordetella can survive for up to a few weeks. The other good news is that they are all inactivated by virtually all routinely used disinfectants. The exception is adenovirus; it is an un-enveloped virus, and is reliably inactivated by only a handful of disinfectants, including household bleach (5% sodium hypochlorite) diluted at 1:32, or by potassium peroxymonosulfate (Virkon® or Trifectant®).

Keep in mind that the survival of any germ will be greatly improved by moisture in the environment; thus it is important that surfaces be in good repair (to prevent pooling of water), and cleaning should be followed by thorough drying on a daily basis.

The way you clean is just as important as the detergents and disinfectants you use: the cleaning process itself could in worst case serve to spread, rather than prevent, disease:

- Ideally dogs should be held in doubled sided runs separated by a guillotine door, this facilitates easy cleaning and disinfection as the dog can be held on one side while the other side is cleaned. In the case of single-sided runs, where the dogs have to be moved from their run for cleaning, they should not be left in a common holding kennel nor tied in aisle-ways while contaminated water and disinfectant is sprayed nearby.
- Disinfectant should be applied via a sprayer or other application system rather than a mop and bucket. Using a mop and bucket will generally result in increased risk of disease transmission as they quickly become contaminated and act as fomites.

- **Removal of infected animals**

It is very important to remember that a mildly infected dog may have a serious disease; these dogs often play an important role in spreading and maintaining CIRDC in a shelter population, especially for the less environmentally durable pathogens such as canine distemper. A perky dog with a mildly snotty nose may very well be shedding a pathogen such as canine distemper or influenza which could be fatal for another animal. Therefore prompt removal of all symptomatic animals, no matter how mild the signs, can be critical in resolving many outbreaks and preventing new ones. All shelter staff and volunteers should be trained to look carefully dogs for clinical signs and scan for sneeze marks on kennel walls any time they are interacting or observing the dogs.

As we know that CIRDC can be spread by airborne transmission we should ideally have isolation areas with separate air flow from the rest of the dog population, for many shelters this is not an option, but disease transmission can still be controlled. Effective isolation can be maintained in almost any facility by providing a physical distance of at least 20 feet between sick and healthy dogs. In a shelter, this could even be accomplished by maintaining 2-3 empty runs between an "isolation area" and a "general healthy population" area, with crime scene tape or some other physical barrier separating the two sections of kennel runs. It is also important to pay careful attention to fomite control.

Treatment

There is no single "drug of choice" for treatment of CIRDC.

For dogs in a pet home with mild illness, antibiotic treatment may be un-necessary. For dogs in the more challenging environment of a shelter, however, antibiotic treatment is often indicated. Culture and sensitivity is indicated in an outbreak or an individual dog that fails to respond to empirical therapy.

Useful links:

UC Davis Koret Shelter Medicine program: www.sheltermedicine.com

CIRDC information sheet:

http://sheltermedicine.com/portal/is_infectious_tracheobronchitis_canine.shtml#top3

Canine Distemper information sheet:

http://sheltermedicine.com/portal/is_canine_distempervirus.shtml#top3

Canine Influenza information sheet:

http://sheltermedicine.com/portal/is_canine_influenza_update.shtml#top3