

Canine Infectious Respiratory Disease Complex

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The following proceedings on the Canine Infectious Respiratory Disease Complex (CIRDC) was adapted from the ISCAID Respiratory Treatment Guidelines (www.iscaid.org). CIRDC is generally characterized by an acute onset of sneezing and coughing, with occasional nasal and ocular discharges can also occur depending on the infectious agent. Fever is uncommon unless pneumonia is occurring. The most common viruses are canine adenovirus 2, canine distemper virus, canine respiratory coronavirus, canine influenza virus, canine herpesvirus, canine pneumovirus, and canine parainfluenza virus. Bacterial primary pathogens include *B. bronchiseptica*, *Streptococcus equi* subspecies *zooepidemicus*, and *Mycoplasma* spp., although these can also be found in clinically healthy dogs. Co-infections with multiple respiratory pathogens are common in dogs with CIRDC.

Vaccines are available for canine parainfluenza virus, canine adenovirus 2, canine distemper virus, canine influenza virus, and *B. bronchiseptica*. With the exception of canine distemper virus, the immunity induced by vaccination does not prevent colonization and shedding of the organisms and clinical signs of disease can develop in vaccinated dogs (2011 AAHA Canine Vaccination Guidelines; www.aahanet.org). However, morbidity is generally decreased in vaccinates compared to dogs that are not vaccinated when exposed to the pathogens. The current canine influenza vaccines against H3N8 are unlikely to provide protection to other canine influenza viruses.

The majority of cases of CIRDC are currently believed to be viral in etiology and so antimicrobial administration is often not indicated. A thorough history and physical examination should be performed on all dogs with suspected CIRDC. Dogs with distemper virus infection may have chorioretinitis, hyperkeratosis of the footpads or planum nasale, and frequently have diarrhea as well as respiratory disease. Dogs with distemper virus infection can have mucopurulent nasal discharge which is sometimes confused with mucopurulent nasal discharge caused solely by primary bacterial pathogens such as *B. bronchiseptica*. Because of its significance to the health of other dogs and for prognosis, the possibility of underlying distemper virus infection should always be considered in young dogs with mucopurulent ocular and nasal discharges, even when other signs of distemper are absent.

Cytology of nasal discharges to diagnose bacterial infection and guide the antimicrobial choice. Aerobic bacterial culture and antimicrobial susceptibility testing, *Mycoplasma* spp. culture (or PCR assay), and molecular diagnostic procedures for canine parainfluenza virus, canine adenovirus 2, canine distemper virus, canine respiratory coronavirus, canine influenza viruses, canine herpesvirus, pneumovirus, *B. bronchiseptica*, and *M. cynos* can be performed. However, each of these organisms can be grown or detected using molecular methods from healthy and diseased dogs and vaccine strains of the organisms can be detected using molecular diagnostic assays. Molecular assays may also be of limited sensitivity by the time dogs are presented for

examination since viral shedding rates tend to peak very early in disease. Thus, these tests are generally not recommended for individual pet dogs. However, if an outbreak of CIRDC is suspected in populations of dogs like those in shelters, breeding kennels, boarding facilities, or multiple dog households, these assays may be indicated, along with bacterial culture and serological testing for viral pathogens, particularly if poor response to therapy or severe clinical disease is occurring. If possible, specimens from respiratory discharges should be collected from several affected dogs and assayed individually to increase sensitivity and positive predictive value and necropsy should be performed if there are fatalities. Infection with *S. equi* subspecies *zooepidemicus* should be suspected if cases of acute hemorrhagic pneumonia or sudden death are reported.

Most dogs with clinical signs of CIRDC including mucopurulent nasal discharge maintain normal appetite and attitude and may resolve spontaneously within 10 days without antimicrobial therapy. Thus, the ISCAID Working Group recommends that antimicrobial therapy be considered within the 10-day observation period only if fever, lethargy, or inappetence are present concurrently. Other management techniques like using a harness rather than a collar use of cough suppressants are usually effective, particularly if viral causes are believed to be likely.

If bacterial CIRDC is suspected in dogs with mucopurulent nasal discharge, fever, lethargy, or inappetence but no clinical evidence of pneumonia, like crackles or wheezes on thoracic auscultation, the ISCAID Working Group recommended administration of doxycycline empirically for 7 – 10 days as the first line antimicrobial option. Doxycycline is well tolerated by dogs and isolates of *B. bronchiseptica* from dogs are typically susceptible in vitro to doxycycline. Doxycycline also has clinical activity against *Mycoplasma*. Optimal duration of therapy for dogs with bacterial causes of CIRDC is unknown but the majority of the ISCAID committee agreed to a 7 – 10 day recommendation.

Additional antimicrobial susceptibility data of secondary bacterial agents like *Pasteurella* spp., *Streptococcus* spp. *Staphylococcus* spp., and anaerobes is needed. However, for *Pasteurella* spp. and *Streptococcus* spp., amoxicillin is usually adequate whereas wild-type strains of *Staphylococcus* spp. are usually susceptible in vitro to amoxicillin-clavulanic acid.

Inhalational aminoglycoside therapy has been anecdotally mentioned as beneficial for the management of dogs with *B. bronchiseptica*-associated CIRDC. However, in the absence of controlled studies for safety or efficacy, the ISCAID Working Group does not recommend this treatment protocol. If clinical signs of CIRDC do not resolve quickly a more extensive diagnostic workup should be considered prior to considering use of other drug classes like fluoroquinolones or azithromycin.

This disease syndrome is usually self-limited or responds quickly to antimicrobial therapy. Thus, primary or repeated diagnostic tests are rarely needed unless pneumonia is suspected. Bacterial culture is not recommended after successful treatment. CIRDC has not been associated with chronic upper respiratory disease in the dog.

Suggested readings

- Chalker VJ, Brooks HW, Brownlie J. The association of *Streptococcus equi* subsp. *zooepidemicus* with canine infectious respiratory disease. *Vet Microbiol.* 2003;95:149-156.
- Chalker VJ, Owen WM, Paterson C, Barker E, Brooks H, Rycroft AN, Brownlie J. Mycoplasmas associated with canine infectious respiratory disease. *Microbiology.* 2004;150:3491-3497.
- Chandler JC, Lappin MR. Mycoplasmal respiratory infections in small animals: 17 cases (1988-1999). *J Am Anim Hosp Assoc.* 2002;38:111-119.
- Chan CM, Ridgway MD, Mitchell MA, Maddox CW. Association between *Mycoplasma*-specific polymerase chain reaction assay results and oral bacterial contamination of bronchoalveolar lavage fluid samples from dogs with respiratory tract disease: 121 cases (2005-2012). *J Am Vet Med Assoc.* 2013;243:1573-1579.
- Ellis JA, McLean N, Hupaelo R, Haines DM. Detection of coronavirus in cases of tracheobronchitis in dogs: a retrospective study from 1971 to 2003. *Can Vet J.* 2005;46:447-448.
- Erles K, Brownlie J. Canine respiratory coronavirus: an emerging pathogen in the canine infectious respiratory disease complex. *Vet Clinics Small Anim* 2008;38:815–825.
- Pesavento PA, Hurley KF, Bannasch MJ, Artiushin S, Timoney JF. A clonal outbreak of acute fatal hemorrhagic pneumonia in intensively housed (shelter) dogs caused by *Streptococcus equi* subsp. *zooepidemicus*. *Vet Pathol.* 2008;45:51-53.
- Priestnall S, Erles K. *Streptococcus zoeeidemicus*: an emerging canine pathogen. *Vet J.* 2011;188:142-148.
- Priestnall SL, Mitchell JA, Walker CA, Erles K, Brownlie J. New and emerging pathogens in canine infectious respiratory disease. *Vet Pathol.* 2014;51:492-504.
- Viitanen SJ, Lappalainen A, Rajamäki MM. Co-infections with respiratory viruses in dogs with bacterial pneumonia. *J Vet Intern Med.* 2015;29:544-551.