

Socially Acquired Microbes of Canine and Their Management

Aakanksha Tiwari, Rajesh Kumar and Garima Pandey

Department of Veterinary Microbiology, CVASc., GBPUA&T, Pantnagar

ARTICLE ID: 003

Introduction

Microbes can be socially acquired by canines in various group settings of the animals. Canine “group settings” or “get-togethers” are the terms used to define grouping or gathering of dogs for an event at one common place. Canine get-togethers or group events are extremely important social interactions for dogs and their owners. These events are very popular and include a wide variety of activities listed below (Sampson and Binns, 2006).

1. Dog shows
2. Dog day care facilities
3. Canine athletic events (e.g. dock jumping, flyball, weight pulls, field trials, herding)
4. Training and socialization centres for puppies
5. Boarding facilities and dog crèche facilities that keep the house owned dogs
6. Community events that involve many dogs (Haverbeke *et al.*, 2008)

Large number of microorganisms in the body is in symbiosis with the body. Some of them may be pathogenic while the others may be non-pathogenic. These pathogens mainly include parasites, viruses, bacteria, fungi, and protozoa. Myriad number of these infectious agents has the potential to be transmitted amongst dogs; out of which some of them commonly cause disease conditions. Some are of particular concern in the events that bring group of dogs together. Moreover, some of these pathogens can spread zoonotically causing illness in people causing additional concerns.

Factors responsible for contracting a disease in group settings:

A proper knowledge of the different disease causing agents is important for making strategies to reduce risk and protect dogs and human beings in these social settings. Whether or not a

dog will develop disease following exposure to an infectious agent is dependent on many factors like type of infection, duration of exposure, dose, mode of transmission and host's immune status. Some infectious agents spread quickly and easily, while others may require a large dose or a close contact with an infectious dog to cause disease. Some pathogens may be killed quickly due to changes in the environment, while others can survive for weeks or months, and may even survive extreme temperatures. Vaccination produces immunity that protects the dog from infection and reduces the severity of illness. The main reason that younger animals are at high risk of contracting a disease is because they may not yet have developed immunity against common infectious agents. Injury, illness, inadequate nutrition and stress can all reduce the body's ability to fight infection, making the animal more prone to develop disease when exposed (Cutt *et al.*, 2007).

Transmission of infectious diseases' agent

Infectious agents can disseminate throughout the canine group setting in various ways. Pathogens can live on or in dogs, humans, feed, water, waste, faeces and fomites. Mosquitoes, ticks and fleas can carry and transmit infectious agents. Apparently healthy animals can even be the carrier to and can spread the infectious agents (Gross *et al.*, 2008). The major routes of transmission for infectious agents between dogs are direct contact, aerosol, oral, vector-borne and fomite. Infectious agents may utilize one or more of these routes to spread disease to susceptible dogs. As per the infectious agent, dogs may spread it through respiratory droplets, saliva, faeces, vomitus, urine, blood, wound seepage, and reproductive fluids. Some require close contact between animals for transmission to occur, while others can contaminate soil, water, cages, floors and fomites including toys, grooming equipment, leashes, food or water bowls, transmitting the infection indirectly. Measures to prevent disease transmission in dogs must consider all of these routes.

Prevention and Control of infectious agents

Scientifically designed strategies should be followed to protect dogs, personnel (owners, handlers, trainers, staff), and the community. These strategies warrant that everyone involved should actively participate and carry out actions that protect animals and people from spreading infection. Prevention and control measures can be broadly divided into two groups (a) measures to decrease dog's exposure to pathogen and (b) measures to decrease dog's susceptibility to pathogen (Tan, 1997).

Eliminating or decreasing exposure of pathogen is one of the most important factors of infection control. Measures to prevent exposure and interrupt routes of transmission are key factors of prevention against most infectious diseases that affect dogs.

Control of the pathogen can be practiced by various ways such as:

1. Do not allow contagious dogs to enter a social gathering.
2. Lowering direct interaction of healthy and infected dogs.
3. Avoiding contact with the objects that might be contaminated with infectious agents.
4. Vectors transmitting diseases should be controlled.
5. Incite awareness for hand washing, hygiene practices among people who are directly or indirectly exposed to dogs.
6. Following effective cleaning and disinfection practices.
7. Early recognition and segregation of potentially infectious dogs from healthy dogs in the group.

Dogs with good overall health and nutritional status have a good immune status and are therefore less susceptible to infections. Underdeveloped immune system or incomplete vaccinations increase the animal's vulnerability towards the infectious diseases. Also, dogs with metabolic disease conditions (e.g. diabetes) are generally more susceptible to infectious disease than healthy dogs. Therefore, following veterinarian's recommendations of preventive care including vaccinations and parasite control measures, are important aspects of reducing vulnerability to infectious agents.

Management of socially acquired infections (Stull *et al.*, 2016)

1. Risk assessment
2. Immunization against microbes
3. Insect control and reducing exposure to wildlife.
4. Vector control and vector-borne disease prevention
5. Prevention of enteric disease-causing agents.
6. Environmental disinfection and hygienic measures
7. Effective recognition of disease and disease response

1. Risk assessment

Risk assessment is a very relevant and a congruous method among the disease prevention strategies. It helps in making preparedness against the occurrence of a disease. It is easy to

prevent infections if the risks are analyzed in advance. Some infectious agents are common throughout certain environments and may be naturally present at certain dog group settings, while others may present a risk only if introduced by an infected dog. Risk assessment for each dog group setting or event should be performed, and strategies should be made to reduce infection before it manifests. Proper identification of a disease' risk helps in establishment of area-specific control and prevention strategies and management policies. Only dogs without evidence of infectious disease should participate in group settings. Dogs that are suspected to be infectious or with signs of infectious disease should be reported to the officials, isolated from other dogs, and excluded from group setting, until a veterinarian declares the condition to be non-infectious.

2. Immunization against microbes

Vaccination not only protects the animal against infection but also reduces the risk of its occurrence in the dogs participating in the group setting. Many infectious diseases that pose the greatest risk to dogs in group settings may be prevented through vaccination. By evoking an immune response, vaccinations decrease susceptibility to certain infectious agents. Some vaccines may eliminate the risk of infection, while others will reduce the risk of infection and the severity of disease. Dogs should receive proper vaccination as appropriate for their age and maintain a current vaccination status for diseases of greatest risk in group settings. All dogs should be vaccinated against rabies in accordance with the jurisdictional laws where the animal lives and the group setting is located (Davlin and VonVille *et al.*, 2012).

3. Insect control and reducing exposure to wildlife

Wildlife is also responsible for spreading various canine infectious diseases. Appropriate actions should be taken to prevent insects, rodents, and other wildlife (e.g. raccoons, skunks, opossums) to gain access to dog housing areas. Canine distemper outbreaks frequently occur in raccoon populations; Leptospirosis is often associated with wildlife; Rabies, most frequently spread by bats and raccoons; and *Salmonella* is passed in the faeces of many wild animals and birds (Knobel *et al.*, 2014; Morse *et al.*, 1976; Adin and Cowgill, 2000). A safe and effective control program against insects, rodents, and other wildlife should be used in and around buildings, parks, and kennels to reduce the risk of infections to dogs.

4. Vector control and vector-borne disease prevention

Fleas are a common parasite of dogs and easily transmit infectious agents by direct contact. Even a bite of a tick raises a concern. They bite the dog to get a blood meal. Fleas cause itching, hair-loss, and other skin infections. They can transmit tapeworms and various diseases to other dogs and humans. Ticks are known to transmit several diseases to dogs and people, including Lyme disease, Babesiosis, Ehrlichiosis, Anaplasmosis, Rocky Mountain spotted fever, Hepatozoonosis, and Tularemia (Higgins, 2004). Environmental management (e.g. keeping grass cut short to reduce ticks and fleas), to minimize vector exposure along with use of effective prevention products for individual dogs are the few keys to successful management and control of vector-borne disease (Shaw *et al.*, 2001).

5. Prevention of enteric disease-causing agents

There are various enteric disease-causing microbes. Some of these include viruses (*Parvovirus*, *Coronavirus*), bacteria (*Salmonella*, *Campylobacter*), protozoa (*Giardia*, *Coccidia*), and intestinal parasites (roundworms, hookworms). These may get transmitted through faeces or faeces-contaminated food, water, or environment. Most of these infectious agents survive in the environment for long time (days to months) where they infect other healthy dogs. To prevent exposure to intestinal infections and parasites, proper feces removal and disposal should be encouraged and eating of faeces by dogs should be prevented. All dogs should be kept on an effective deworming program. Raw meat diets are a known source of foodborne infections (e.g. *E. coli*, *Salmonella*, *Campylobacter*, *Listeria*). All dogs in group settings should also be fed a conventional commercial diet or thoroughly cooked homemade diet to decrease the risk of spreading intestinal infections (Hackett and Lappin, 2003; Giannella *et al.*, 1973).

6. Environmental Disinfection and Hygienic Controls

Effective cleaning and disinfection of the surroundings results in a healthier environment which helps in preventing the spread of infectious disease in animals. A cleaning and disinfection program should be used for all indoor and outdoor canine sitting areas, such as exercise and housing areas. Key principles for preventing infection should be followed, including prompt removal of feces, cleaning of hands of the owner and the attendants with soap and water (Mann, 2017).

7. Disease Recognition and Response

Timely identification and awareness of disease marks a very important tool to prevent the transmission of an infectious agent. Dog owners should carefully watch their dogs and report any signs that potentially indicate an infection. Periodic monitoring of the dog health is to be done and report to the associated veterinarian if dog is exhibiting any abnormal signs. Policies containing this information should be written and displayed for public awareness. Disease awareness and action plans are critical for prevention and containment of outbreaks (Sargan, 2004; National Research Council, 1994).

Conclusion

Socially acquired infections are increasing day by day proportionate to the increase in number of social or group settings. Therefore, it becomes paramount importance for the organizers to carry out the appropriate disease recognition and prevention strategies. Further, the dog owner should be aware of such type of infectious diseases and should be fully aware about the prevention of the animal from such infections. Proper hygienic measures and health monitoring of all the dogs should be carried out at every group setting.

References:

- Adin, C.A. and Cowgill, L.D., 2000, Treatment and outcome of dogs with leptospirosis: 36 cases (1990–1998), *Journal of the American Veterinary Medical Association*, **216(3)**, pp.371-375.
- Cutt, H., Giles-Corti, B., Knuiaman, M., Burke, V., 2007, Dog ownership, health and physical activity: A critical review of the literature, *Health & place*, **13(1)**, pp.261-272.
- Davlin, S.L. and VonVille, H.M., 2012, Canine rabies vaccination and domestic dog population characteristics in the developing world: a systematic review, *Vaccine*, **30(24)**, pp.3492-3502.
- Giannella, R.A., Broitman, S.A., Zamcheck, N., 1973, Influence of gastric acidity on bacterial and parasitic enteric infections: a perspective, *Annals of internal medicine*, **78(2)**, pp.271-276.
- Gross, T.L., Ihrke, P.J., Walder, E.J., Affolter, V.K., 2008, *Skin diseases of the dog and cat: clinical and histopathologic diagnosis*. John Wiley & Sons.
- Hackett, T. and Lappin, M.R., 2003, Prevalence of enteric pathogens in dogs of north-central Colorado, *Journal of the American Animal Hospital Association*, **39(1)**, pp.52-56.

- Haverbeke, A., Laporte, B., Depiereux, E., Giffroy, J.M., Diederich, C., 2008, Training methods of military dog handlers and their effects on the team's performances, *Applied Animal Behaviour Science*, **113(1-3)**, pp.110-122.
- Higgins, R., 2004, Emerging or re-emerging bacterial zoonotic diseases: bartonellosis, leptospirosis, Lyme borreliosis, plague, *Revue Scientifique et Technique-Office International des Epizooties*, **23(2)**, pp.569-582.
- Knobel, D.L., Butler, J.R., Lembo, T., Critchlow, R., Gompper, M.E., 2014, Dogs, disease, and wildlife, *Free-ranging dogs and wildlife conservation*, pp.144-169.
- Mann, A., 2017, The importance of hand hygiene, *Veterinary Nursing Journal*, **32(3)**, pp.82-85.
- Morse, E.V., Duncan, M.A., Estep, D.A., Riggs, W.A., Blackburn, B.O., 1976, Canine salmonellosis: A review and report of dog to child transmission of Salmonella enteritidis, *American Journal of Public Health*, **66(1)**, pp.82-83.
- National Research Council, 1994, *Laboratory animal management: dogs*, National Academies Press (US).
- Sampson, J. and Binns, M.M., 2006, The Kennel Club and the Early History of Dog Shows and Breed Clubs, *Cold Spring Harbor Monograph Archive*, **44**, pp.19-30.
- Sargan, D.R., 2004, IDID: inherited diseases in dogs: web-based information for canine inherited disease genetics, *Mammalian Genome*, **15(6)**, pp.503-506.
- Shaw, S.E., Day, M.J., Birtles, R.J., Breitschwerdt, E.B., 2001, Tick-borne infectious diseases of dogs, *Trends in parasitology*, **17(2)**, pp.74-80.
- Stull, J.W., Sherding, R.G., O'Quin, J., 2016, Infectious disease in dogs in group settings: Strategies to prevent infectious diseases in dogs at dog shows, sporting events, and other canine group settings.
- Tan, J.S., 1997, Human zoonotic infections transmitted by dogs and cats, *Archives of Internal Medicine*, **157(17)**, pp.1933-1943.