Zoonotic Disease: What you Don't Know Can Hurt You

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Zoonotic disease has always been an area where veterinarians have been involved. Zoonotic infections can be viral, bacterial, fungal and parasitic in origin. The veterinary profession has helped protect people from potentially lethal zoonotic infections, for example by widespread vaccination of domestic animals against rabies. Complacency over infectious diseases had increased in industrialized countries with the advent of antibiotics and vaccinations to the point where infectious disease was an issue apparently of little importance. Recent times have shown this assessment to be incorrect with new players such as HIV and more recently SARS. There are however still plenty of old players around that have not went away just because they were ignored, some of them are zoonotic. It is our duty as veterinarians to protect the general public from these threats as best as possible. It is also vital to have an understanding of zoonotic disease to prevent infection of those people routinely involved with large numbers of animals, namely the veterinary health care team including veterinarians. Fortunately many of the zoonotic diseases of concern are preventable or the chances of transmission to humans can be significantly reduced by proper education and management techniques. This article will review some of the diseases to be concerned about, though obviously it is not an all-inclusive list of all zoonotic diseases.

Bacterial zoonoses

Many zoonotic diseases are bacterial in origin. Many of these bacteria are enteric organisms, as a result feces is a major way to spread these infections. Others can be transmitted via bites or scratches such as Bartonella. Especially with enteric bacteria it is important to remember that clinically healthy animals can still harbor pathogenic bacteria. Elimination of these bacteria is often not possible so it is very important that measures are put into place in practices to minimize the risk to other patients, staff and the general public. It is also very important to educate clients to the potential risks, especially if the household has members that are not fully immunocompetent.

Salmonellosis

Salmonellosis has received public attention on occasion. Most cases of this disease are acquired as a result of ingestion of contaminated food. Raw chicken and uncooked eggs are generally recognized as common sources of salmonella infections in man. The risks of exotic pets, especially in regard to turtles have also been widely publicized. Another area that has received some media attention is rawhide chews which can be contaminated with salmonella. Depending upon the source, a large percentage of rawhides and pig ears can harbor salmonella. In one outbreak it was shown that contact with the treats or pets that consumed them was responsible for human salmonellosis. Of 94 pig ear samples from retail outlets 51% were harboring Salmonella. Salmonella was also found in other treats including beef hoof, braided chews and similar products. Of great concern were outbreaks of multidrug resistant Salmonella typhimurium in small animal facilities including an animal shelter and 2 small animal clinics in 1999. In one veterinary clinic the likely source of the infection was a kitten with diarrhea, 10 of 20 employees developed clinical signs. In another instance one affected person was an employee and 2 were clients that had brought their cats to the clinic for treatment. After discharge the cats developed diarrhea and the owners subsequently became ill. This obviously raises the specter of liability for the pet and owner's illness.

It certainly is not surprising that dogs can also harbor Salmonella species. Most recent studies have shown a prevalence of around 1 to 2 % in normal dogs and cats. Percentages may be higher in animals with diarrhea. Very high prevalence had been found in racing sled dogs, where 69% of dogs without diarrhea were shedding salmonella. In Greyhounds with diarrhea 61% were positive for Salmonella, in non-diarrheic dogs the percentage was 11%. The increased proportion of Salmonella positive animals in these dogs may relate to the stress of athletic performance or to their diets.

Raw meat can be a source of salmonella infection in dogs. This has been shown in a variety of studies looking at athletic dogs such as Greyhounds and sled dogs that routinely receive uncooked meat as part of their diet. Recently there has been considerable interest in raw diets for pet dogs, the most popular called BARF (biologically appropriate raw food). The internet is replete with sites that popularize this type of diet and its supposed health benefits. It does however mean that owners are routinely contaminating their environment with potentially infectious materials such as raw chicken. Dogs are not known to be especially clean eaters and it is highly likely that infectious organisms are disseminated throughout the home. In a recent study on a small number of dogs, 30% of dogs fed a BARF diet were shedding Salmonella, 80% of the food samples were positive. This has also been my personal experience where dogs fed BARF diets are positive for Salmonella (2 of 3 tested) even without clinical signs of diarrhea.

Campylobacter

The prevalence of campylobacter closely parallels that of Salmonella in cats, with approximately 1% harboring this infection. The prevalence in dogs is considerably higher in some studies where up to 28% of dogs are infected. Other studies however show the prevalence to also be around 1%. The majority of human cases are acquired by ingestion of contaminated food. The percentage of poultry with campylobacter is higher than the percentage with salmonella. There is the possibility of spread from dog or cat to man. The majority of dogs will not show clinical signs if infected.

Prevention

Some very simple management techniques can prevent bacterial infections from being transmitted. Hand washing is vital; it should be done between each patient and certainly before eating. Food should also remain out of the area where animals are handled. In those cases with diarrhea or proven infections gloves should be worn when handling the patient and hands washed after removing the gloves. Patients with diarrhea, confirmed or suspected zoonotic infections should also be isolated from other animals, especially those that are very susceptible to infections such as those with major trauma, surgeries or on immune suppressive therapy. Animals fed raw meat diets should be considered carriers of pathogens until proven otherwise. Antibiotics should obviously be used wisely to limit the emergence of resistance strains. Dogs diagnosed with renal failure that do not have an obvious cause, i.e. ethylene glycol intoxication, should be tested for leptospirosis. Even after exposure a short course of antibiotics can prevent clinical disease in humans.

Parasitic zoonoses

Unlike bacterial infections, parasites are much easier to prevent. There are a wide variety of effective deworming medications that can eliminate or at least significantly decrease the chances of contracting parasites. Unfortunately, the indications are that we as veterinarians do a relatively poor job of this. In 1991 a survey of veterinarians showed that recommendations in regard to parasite control were inadequate. Only approximately 1/3 of veterinarians routinely discussed the zoonotic risk of parasites with owners. Almost 2/3 of the veterinarians incorrectly recommended treating intestinal parasites beginning at an age over 4 weeks. Less than half gave preventive anthelmintics to pups and dogs and about 1/3 did not recommend routine testing and treatment of nursing dogs. Approximately three fourths of the veterinarians tested for helminths in pubs. Unfortunately, over half of the respondents did not initiate therapy unless there was a positive fecal test. This is not appropriate since fecals can be negative even when the dogs are harboring adult parasites. Even more shocking was that almost half of the veterinarians surveyed considered roundworms or hookworms of little or no concern as a zoonosis. The majority of veterinarians in this survey did not even come close to properly addressing parasite burdens. More recently a survey was carried out of Connecticut pediatricians and veterinarians. The only comfort we can get from this study is that veterinarians seem to do a better job of discussing zoonosis than physicians. Interestingly veterinarians thought physicians or public health departments were responsible for public education whereas physicians thought it should be public health departments or veterinarians, which means both groups did not feel they had ultimate responsibility in this regard. Considering that ten years had elapsed between studies there was little indication that prevention strategies had improved. Only about 12% of veterinarians began deworming puppies at 2 to 3 weeks of age. The greatest majority (78%) didn't begin treatment till the puppies were over 6 to 7 weeks of age. Slightly more than 50% of veterinarians carry out prophylactic deworming of puppies and kittens, unfortunately almost half of them use an interval greater than 2 weeks as recommended by the Centers for Disease Control. Parasite control is an area where small animal practitioners need to do a much better job in the interest of the pets and the general public.

Roundworms

Roundworms are still of major zoonotic concern. Prevalences vary from $3\%^8$ to 33%. Prevalences tend to be higher in kittens and puppies, though this may be misleading in that shedding is more intermittent in adults. Zoonotic transmission to humans does occur, with children being especially susceptible to the negative affects. Visceral larva migrans can be a devastating disease. In Connecticut 10.2 to 27.9% of children were seropositive for exposure to roundworms. Thousands of cases are diagnosed each year. Pups acquire Toxocara canis in utero, transmammary or fecal-oral. The adults can become patent and begin shedding eggs at 3 weeks of age. In cats in utero infection does not appear to occur, infection is transmammary or fecal-oral. The eggs are very resistant and can persist for years in the environment.

Prevention

In dogs and cats it is inappropriate to test for intestinal parasites and then not treat because of a negative fecal. Shedding is intermittent and can be low grade. Routine prophylactic deworming is ideal in all patients; the current dewormers available are highly efficacious with a low incidence of side effects. Puppies should be started at 2 weeks of age and should be dewormed every 2 weeks thereafter until 8 weeks old. Kittens can be started at 6 weeks and repeated at 8 and 10 weeks. Four to 6 weeks after anthelminthic therapy is completed it would be advisable to perform a fecal exam to make sure the parasites have been eradicated. Treating the nursing dam is also indicated, as they will often begin to shed heavily around the time of parturition. Many heartworm preventives can also aid in reducing parasite burdens in adult dogs, although the 4 week interval will allow shedding and may not be adequate for heavily exposed dogs. If one of these heartworm preventives is not used then at least annual deworming is recommended, more frequently if indicated by exposure risk (puppies, kennel, etc.). Extensive recommendations for prevention of zoonotic transmission of intestinal parasites from pets to humans can be found on the CDC website at http://www.cdc.gov/ncidod/dpd/parasites/ascaris/prevention.htm. Another part of the CDC website that is well worth surfing is http://www.cdc.gov/ncidod/dpd/parasitepathways/animals.htm as there are great handouts available that explain about the parasites that can be very informative for clients.

Hookworms

Hookworms can be found in many areas of the country though the southeast appears to have a greater prevalence of Ancylostoma than other regions. Hookworm larvae can penetrate the skin of humans leading to cutaneous larva migrans. More severe manifestations are also possible with skeletal muscle involvement, visceral migrans and human intestinal involvement. Prevention programs are the same as for roundworms.

Tapeworms

The most common tapeworm in dogs and cats, Dipylidium caninum, is not zoonotic. There is increasing concern however about Echinococcus multilocularis. Originally limited to Alaska it is now enzootic to northcentral US and southcentral Canada, though it has been identified in Wyoming, Nebraska, Iowa, Ohio, Indiana and Illinois. The main reservoirs are foxes and coyotes. Ingestion of eggs from this parasite by a human lead to alveolar hydatid disease, a potentially fatal occurrence. The liver and other organs are usually affected, surgery is often not curative. To date only a few people have been diagnosed with this disease, given its spread it is likely this will increase. Since this is a highly fatal disease preventive measures should be instituted. In areas where E. multilocularis is known to be dogs and cats that are predatory should routinely be dewormed with a medication that eliminates tapeworms as well as the other common intestinal parasites.

Given the central role veterinarians play in the healthcare of pets we have a vital role in minimizing the risk of zoonotic disease. We also need to be especially vigilant with these diseases as they can spread to other animals we are caring for or potentially to us or the people that work for us. The surveys that have been done to date do not suggest that we are doing the best that we could. Recognizing the importance of zoonotic disease and providing educational information to pet owners will increase the quality of medicine we practice and good medicine is always good for a practice.

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