Zoonotic Concerns for Small Animal Veterinary Clinics
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Zoonoses are infectious agents able to be transmitted directly from animals to humans. Due to occupational exposure, small animal practitioners and staff are likely exposed to zoonotic agents with some regularity although incidence of illness stemming from this risk is unknown, as there is a paucity of literature in this area. Although there are too numerous to count zoonoses that small animal practitioners may face, a recent survey of small animal practitioners in the U.S. found that the zoonoses most veterinarians were concerned about included ringworm (71%), GI bacteria (39%), GI parasites (37%), leptospires (34%), rabies (22%), Toxoplasma gondii (21%), and unknown or emerging pathogens (21%). Despite recognized concern of zoonotic exposure, there appears to be a disconnect with veterinary personnel failing to take proper measures to protect themselves from acquiring these diseases.

Specific zoonotic diseases of concern

Dermatophytosis, caused by Microsporum canis, Trichophyton mentagrophytes, and Microsporum gypseum, is one of the most common zoonotic agents that veterinarians encounter. In a recent study surveying practicing veterinarians about their personal history with zoonotic disease, ringworm infection was reported most commonly, with 54% of veterinarians reporting acquiring this infection, mostly from exposure to cats. The highly infectious spores can be spread through direct contact, fomites, or fleas. With its high level of contagiousness, ringworm is also a nosocomial concern; in one study 15/50 veterinary clinics had M. canis isolated from the floor of the waiting room, exam room, or wards. Prevention of ringworm transmission relies on wearing gloves when examining pets with skin lesions (especially those with any known contact), treating all pets in a home, quarantining or preventing contact in the home until three negative cultures have been obtained, and proper cleaning of the hospital and home environment.

With the emergence of antibiotic resistant Staphyloccus spp and the high prevalence of Staph pyodermas seen in dogs and cats, zoonotic and anthropothonotic transmission of Staph spp. has become a concern. While dogs and cats can carry antibiotic sensitive S. aureus and methicillin resistant S. aureus (MRSA), it continues to be more common for dogs and cats to carry S. pseudintermedius (previously known as S. intermedium). S. pseudintermedius remains the most common cause of pyodermas in veterinary patients, and is usually sensitive to many antibiotics, including cephalosporins. For veterinary patients with pyodermas that do not respond to first-line antibiotics, a culture to identify the infecting organism (including the species of Staphyloccus) and antibiotic susceptibility is recommended; this is important to guide therapy for the veterinary patient as well as to allow optimal recommendations for the household. Both S. pseudintermedius and S. aureus can spread between species (canine and human) in both directions. Immunosuppressed people may be at increased risk for acquiring resistant S. pseudintermedius from a pet, and these patients should be isolated from immunosuppressed people during treatment if possible. We also worry that MRSA can spread anthroponotically (from humans to pets); dogs and cats may be transient carriers or subclinical reservoirs (colonized) with MRSA or could develop clinical illness (post-operative wound infections, catheter-associated infections, urinary tract infections). Many pets colonized with MRSA will clear the MRSA on their own if isolated from the infected owner while the owner is treated, while pets with clinical illness require topical or systemic antibiotic therapy. One study found 18% of veterinary staff, 9% of canine patients, and 10% of environmental samples within a teaching hospital in the UK to be contaminated with MRSA, often the same strain. Sources of contamination in the environment can include stethoscopes, cell phones, door handles, cage doors, and water bowls. Prevention of Staphyloccus transmission between species relies on preventing direct contact (wearing gloves), keeping the environment clean, and prompt treatment of ill individuals (pets or owners).

Bartonella spp are Gram-negative bacteria that are highly adapted to one or more mammalian hosts. They have evolved to survive intracellularly, allowing some protection from the immune system, persistent infections, and challenging diagnoses. Bartonella henselae is transmitted among young cats via flea vectors, and transmission to humans can occur through the bite or scratch of an infected cat or by infected flea feces contaminating an open wound. Disease in humans is often (>75%) self-limiting, mild, and flu-like with lymphadenomegaly; however up to 25% of infected people can have complications including endocarditis, encephalitis, ocular abnormalities, and renal disease among others. Most infected cats are subclinical, although the full extent of Bartonella’s pathogenesis in cats is still being investigated. Prevention centers on flea control in cats. Risk of bartonellosis is increased in veterinary personnel (due to increased exposure), and a recent survey found this to be the second most commonly reported zoonoses among practicing veterinarians. Immunosuppressed people are also at increased risk. Precautions for minimizing exposure for all people includes using caution during feline restraint and discouraging rough play with young cats (to prevent scratches and bites), strict flea control, maintaining good hygiene (wash hands frequently), and specifically it is recommended that households with immunosuppressed people own adult cats rather than kittens.

Kennel cough, frequently caused by Bordetella bronchiseptica, is a commonly diagnosed condition in pet dogs and occasionally in pet cats. There are reports of Bordetella bronchiseptica being diagnosed in pediatric lung transplant patients and HIV patients who had
contact with ill dogs, suggesting potential zoonotic transmission. Further research is needed to confirm this route of transmission and zoonotic risk. Until further research is available, immunosuppressed people should avoid contact with dogs suspected or confirmed to be infected with *Bordetella* as well exposure to live *Bordetella* vaccines which can rarely revert to virulence.

Leptospirosis, caused the Gram-negative spirochete *Leptospira interrogans*, is a zoonotic agent of worldwide importance. Transmission occurs from direct contact with infected urine or from water, food, or soil that is contaminated with infected urine. In small animal practice, dogs with clinical signs consistent with leptospirosis (acute renal failure, liver disease) should be tested promptly to confirm infection and precautions taken until results are available. Within veterinary hospitals, dogs suspected or confirmed to have leptospirosis should either have an indwelling urinary catheter or urinate in an isolated area that is easily bleached. Personnel should wear protective clothing (gloves, mask, boots, and gown) when handling these patients and when cleaning their cages to avoid exposure through direct contact or aerosolization of bacteria. All waste should be disposed of as biohazardous material. Caution should also be taken with pet rats, as exposure to their urine is another reported route of zoonotic transfer of leptospirosis to veterinary personnel. Although data are not available regarding the prevalence of leptospirosis in pet rodents, a high proportion of inner city cats carry and shed leptospires. Therefore wearing gloves is advised when handling pet rats, and thorough hand hygiene is recommended if any contact with urine is experienced.

Although exposure to *Salmonella* spp. is a known risk whenever handling reptiles and amphibians, small animal practitioners and staff may also be at risk of exposure when examining dogs and cats who eat raw diets. Research shows that pets eating raw diets shed increased *Salmonella* in their feces (compared to those eating cooked foods) but may not show symptoms of diarrhea. With grooming and licking behaviors typical in most pets, *Salmonella* from these pets’ feces could spread throughout the pets’ hair and then to the hands of their owners and veterinary personnel, as well as other surfaces in the clinic. Ingestion of raw diets pose risk of additional infections for the pet, resulting in additional exposures for clients and veterinary personnel, including: *Campylobacter*, *E. coli*, *Toxoplasma*, *Cryptosporidium*, and others. For this reason, educating veterinary personnel about the risks of handling reptiles and pets who eat raw foods (in addition to educating clients who may not understand these risks themselves) is important. Immunosuppressed individuals should avoid exposure all together, and others should take care to wear gloves during contact and wash hands thoroughly after exposure.

Veterinary personnel and cat owners have long been considered at increased risk for exposure and seropositivity to *Toxoplasma gondii*; however, newer studies have challenged this risk. A study by Jones et al found that seropositivity in Americans over the age of 12 years was 22.5%, while a study by Shuhaiber et al performed at the Ontario Veterinary Medical Association Conference found that healthy veterinarians and technicians who expected positive results based on exposure had a 14.2% seropositivity rate. Cat ownership, contact with cats, including those who hunt or eat raw meat, and cleaning litter boxes were not found to be risk factors for seropositivity in recent studies. While these studies help to clarify risk of toxoplasmosis, education about its zoonotic potential remains paramount to prevent human illness. Continued focus on hygiene around cats and their feces is important, as well as education about transmission through undercooked meats and exposure to contaminated soil (including gardening and handling fresh produce).

**Legal implications**

A practice owner could be held liable for a staff member (employee or volunteer) becoming ill from a zoonotic disease acquired during employment at that small animal practice. Owners of veterinary clinics should be proactive about ensuring a safe working environment for all veterinary staff. This includes creating an infection control plan (if not already in place) and education of new staff and frequent updates for existing staff about zoonotic concerns and personal protection. It is also important to be sure staff know how to implement proper infection control measures to minimize this risk and maintain a safe working environment. Involvement of staff in development and revisions of the infection control plan as well as in continuing education (i.e. rotating who presents brief topic rounds regarding an infection control topic during a staff meeting) is a great way to keep infection control at the forefront and to establish an environment of awareness and safety in your hospital. Veterinarians should also make it clear to staff and volunteers that they should seek medical attention from their physicians if they have any concerns of acquiring a zoonotic disease. For legal reasons, it is recommended to keep records of all training of staff, just as you should record discussions of zoonotic risk with a client in their patient’s medical record.

**Selected references**


