

2019 AAFP Feline Zoonoses Guidelines



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Aim: The overarching purpose of the 2019 AAFP Feline Zoonoses Guidelines (hereafter referred to as the ‘Guidelines’) is to provide accurate information about feline zoonotic diseases to owners, physicians and veterinarians to allow logical decisions to be made concerning cat ownership.

Scope and accessibility: The Panelists are physicians and veterinarians who worked closely together in an attempt to make these Guidelines a document that can be used to support the International One Health movement. This version of the Guidelines builds upon the first feline zoonosis panel report, published in 2003 (catvets.com/guidelines), and provides an updated reference list and recommendations. Each of the recommendations received full support from every Panelist. Primary recommendations are highlighted in a series of ‘Panelists’ advice’ boxes.

Keywords: Zoonoses; ownership; wellness; bacterial; parasitic; rickettsia

Introduction

The American Association of Feline Practitioners (AAFP) first published a feline zoonoses panel report in 2003, followed by a panel report on feline bartonellosis in 2006.^{1,2} Those documents were extensively referenced and this version will focus on new information published since 2003. The aim of these Guidelines is to offer practical recommendations to help physicians and veterinarians provide accurate information to owners concerning health risks associated with cat ownership. (See **Panelists’ advice** 1.)

Panelists’ advice (1)

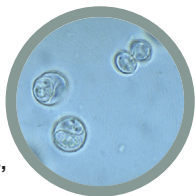
The Panelists urge veterinarians to take an active role with owners and their physicians to help families make appropriate decisions concerning pet ownership.

The recommendations of the Panelists are based on published data when available, and recommendations of other public health affiliated groups are taken into consideration. Information from the Centers for Disease Control and Prevention (CDC; cdc.gov/healthypets/index.html), the Companion Animal Parasite Council (CAPC; capcvet.org), the World Small Animal Veterinary Association (WSAVA) One Health Committee (wsava.org/educational/one-health-committee)

CONTENTS	page
❖ Introduction	1008
❖ Enteric zoonoses	1010
❖ Scratch, bite or exudate exposure zoonoses	1011
❖ Ocular or respiratory zoonoses	1013
❖ Urogenital tract zoonoses	1014
❖ Vector-borne zoonoses	1015
❖ Lessening the risk of zoonotic transfer of disease from cats	
– General guidelines for veterinary staff members	1016
– General guidelines for cat owners	1016
❖ Summary points	1017
❖ References	1017
❖ Appendix: Client brochure	1020

and the American Association of Food Safety and Public Health Veterinarians (AAFSPHV; aaphv.org) was consulted and referenced within this Guidelines document.

For each recommendation in the draft documents, the Panelists were individually asked whether they agreed or disagreed with the recommendation. All of the final recommendations were supported by each Panelist.



After the Panelists had what was considered a final document, select members of the CAPC board and the WSAVA One Health Committee were asked to make comments, which were considered for inclusion in this document. Select members of the International Society of Feline Medicine (ISFM) also reviewed the document.

Zoonotic diseases are defined as being common to, shared by, or naturally transmitted between humans and other vertebrate animals. There are multiple agents that can infect cats and their owners, and these are summarized in Tables 1–5.^{1,3} Humans are infected with zoonotic agents from direct contact with infected cats, contact via contaminated food or water, from shared vectors and from the shared environment. Direct contact with feline feces (enteric zoonoses), respiratory secretions, urogenital secretions, or infected skin and exudates, as

well as bites and scratches, can result in human infections. Some zoonotic agents are transmitted between cats and people by shared vectors such as fleas, ticks or mosquitoes. *Anaplasma phagocytophilum* (ticks), *Borrelia burgdorferi* (ticks), *Ehrlichia* species (ticks), *Bartonella* species (fleas, ticks), *Rickettsia felis* (fleas) and *Dirofilaria immitis* (mosquitoes) are examples of vector-borne zoonoses.^{4,5} With these agents, the cat potentially brings the vector of the organism into the human environment, resulting in exposure.⁶ Some zoonotic agents, including *Histoplasma capsulatum*, *Coccidioides immitis*, *Blastomyces dermatitidis*, *Cryptococcus neoformans* and *Aspergillus* species, do not usually infect humans through direct contact with the infected cat but are acquired from the same environmental source. Other agents like *Sporothrix* species can be acquired from infected cats or the environment.^{7,8}

Table 1 Potential enteric zoonotic agents of cats

Agent	Principal clinical syndromes	
<i>Ancylostoma</i> species (hookworms)*	Cats Humans	Blood loss anemia, diarrhea, failure to thrive Cutaneous larva migrans, eosinophilic pain syndrome
<i>Campylobacter jejuni</i> and <i>Campylobacter coli</i> (bacteria)†	Cats Humans	Subclinical infection or diarrhea and vomiting Diarrhea and vomiting
<i>Cryptosporidium felis</i> (coccidian)‡	Cats Humans	Subclinical infection or diarrhea Immunocompetent: self-limiting diarrhea and vomiting Immunocompromised: severe protracted diarrhea
<i>Escherichia coli</i> (bacterium; some strains)	Cats Humans	Subclinical infection or diarrhea and vomiting Diarrhea and vomiting
<i>Echinococcus multilocularis</i> (cestode)	Cats Humans	Subclinical infection Polysystemic disease
<i>Giardia</i> species (flagellate)§	Cats Humans	Subclinical infection or diarrhea and vomiting Diarrhea and vomiting
<i>Helicobacter</i> species (bacteria)¶	Cats Humans	Vomiting Reflux disease and vomiting
<i>Salmonella</i> species (bacteria; some strains)	Cats Humans	Subclinical infection or signs of bacteremia; diarrhea and vomiting Diarrhea and vomiting
<i>Strongyloides stercoralis</i> (hookworm)	Cats Humans	Blood loss anemia, failure to thrive Cutaneous larva migrans
<i>Toxocara cati</i> (roundworm)*	Cats Humans	Vomiting, failure to thrive Ocular and visceral larva migrans
<i>Toxoplasma gondii</i> (coccidian)#	Cats Humans	Subclinical infection; rarely diarrhea, polysystemic disease Congenital infection Immunocompromised: central nervous system and ocular disease
<i>Uncinaria stenocephala</i> (hookworm)*	Cats Humans	Blood loss anemia, diarrhea, failure to thrive Cutaneous larva migrans
<i>Yersinia enterocolitica</i> (bacterium)	Cats Humans	Subclinical infection Diarrhea and vomiting, mesenteric lymphadenopathy

**Ancylostoma braziliense* is the most likely to cause cutaneous larva migrans in the USA. Infective larvae develop after passage of the eggs into the environment; hence, direct transmission through contact with cats is less likely than exposure through environmental contamination

†Most cats are infected by *Campylobacter upsaliensis*; this host-adapted species is rarely found in humans

‡Most cats are infected by *C. felis*, and this host-adapted species is rarely found in humans

§Host-adapted and zoonotic assemblages exist. Cats can harbor zoonotic assemblages, but whether levels of infection result in reinfection of humans is not established

¶Most *Helicobacter* species found in cats are host-adapted species. When *Helicobacter pylori* is detected in a cat it is likely from reverse zoonotic transmission

#Sporulation of oocysts occurs after passage into the environment; hence, direct transmission by contact with cats is less likely than exposure through environmental contamination

While *Toxoplasma gondii* infection is acquired commonly from ingestion of sporulated oocysts, in humans this likely occurs more frequently from environmental, water or food contamination rather than direct contact with (petting) their own cats.



Most of the agents discussed in these Guidelines can infect and cause disease in anyone, but disease is generally more prevalent or more severe in those with immunodeficiency-inducing disorders.⁹ Humans with AIDS are discussed most frequently, but there are many more individuals with immunodeficiencies, including the very old, the very young, individuals receiving chemotherapy or glucocorticoids for immune-mediated diseases, organ transplant recipients and cancer patients. Humans are unlikely to contract zoonotic diseases from direct contact with their healthy cats and the mental health benefits from pet ownership can be considerable.^{10,11} Pet ownership is known to improve general sense of wellbeing and there is some evidence that happiness influences immunological factors.¹²

General recommendations to help prevent zoonotic transfer of disease for owners and veterinarians are presented in the box on page 1016. In each of the subsections that follow, additional recommendations are provided based on the route that humans are exposed to feline zoonotic agents.

Enteric zoonoses

There are multiple infectious agents of the gastrointestinal tract that can be shared between cats and humans (Table 1). Since some enteric zoonotic agents (eg, some *Campylobacter* species, *Salmonella* species, *Yersinia enterocolitica*) are infectious when passed in feces, direct contact with infected cats can result in human infection and disease.^{13,14} Some enteric agents of cats that are infectious immediately in feces, like *Giardia* species or *Cryptosporidium felis*, are not considered significant zoonotic agents; when these infections occur, the strains are generally cat-specific.^{15–18}

Other infectious agents, such as *Ancylostoma* species, *Toxocara cati* and *Toxoplasma gondii*, require a period of time out of the host prior to becoming infectious. Thus, many enteric zoonoses result from ingestion of the infectious agent in contaminated food, water or other environmental sources. (See **Panelists' advice 2.**)

Panelists' advice (2)

The Panelists recommend that all meat be cooked, produce and fruits carefully washed or cooked, and water from the environment filtered, boiled or chemically treated prior to ingestion to lessen the risk of exposure to enteric zoonotic agents. In addition, if a family member has any form of immunodeficiency, the Panelists recommend avoiding contact with cats of unknown health status, particularly those with diarrhea, and washing hands carefully after handling cats.

Humans with immunodeficiency syndromes should avoid direct contact with cats other than their personal, healthy pets.



Panelists' advice (3)

The Panelists support the American Veterinary Medical Association (AVMA) policy of *not* feeding raw meat to pets (avma.org/KB/Policies).

Raw meat can harbor enteric pathogenic bacteria like *Campylobacter* species, enterotoxigenic *Escherichia coli* and *Salmonella* species.^{19–21} Freezing meat does not consistently kill all bacteria and it is recognized that feeding raw meat to pets can result in amplification of potentially pathogenic bacteria in animal feces. (See **Panelists' advice 3.**) The consensus statement of the American College of Veterinary Internal Medicine (ACVIM) on enteropathogenic bacteria in dogs and cats is an excellent resource for information concerning the control of bacterial zoonotic agents.²²

Some *Ancylostoma* species of cats are associated with cutaneous larva migrans and *T. cati* is associated with ocular and visceral larva migrans (see Table 1). *Toxocara* species eggs were found on the fur of dogs

and cats in one study, but were non-viable.²³

While hookworm and roundworm egg shedding is generally highest in kittens, adult cats can also shed eggs that become infectious in the human environment.^{24–26} (See **Panelists' advice 4.**)

Panelists' advice (4)

The Panelists support the CAPC recommendations regarding deworming of kittens and continued scheduled deworming for adult cats (capcvet.com). The Panelists suggest that heartworm preventives that also control hookworms and roundworms administered year-round are reasonable choices for lessening the human risk of exposure to these parasites.

Cats (and other felids) are the only definitive host for *T. gondii* and shed millions of oocysts in feces after primary infection.²⁷ Once these oocysts have sporulated (Figure 1), infection of humans can occur. Human exposure can also occur by ingestion of *T. gondii* tissue cysts and transplacentally if a previously uninfected mother ingests sporulated oocysts or tissue cysts during pregnancy. It is now known that humans are commonly infected by ingestion



Figure 1 *Toxoplasma gondii* sporulated oocysts (8 µm x 10 µm), each containing two sporocysts. This form of the oocyst is zoonotic to humans

Panelists' advice (5)

The Panelists believe that since cats only shed *T gondii* oocysts for a short time and oocysts require 1–3 days to sporulate, the source of sporulated oocysts ingested by humans is more likely environmental contamination rather than direct contact with (petting) their own cats.²⁷

of sporulated oocysts.²⁸ (However, see **Panelists' advice 5**.)

Most studies evaluating cat ownership as a risk factor for human toxoplasmosis have shown minimal associations, including one study of HIV-infected individuals.²⁹ In addition, in one study, veterinary staff members that worked frequently with cats had low seroprevalence rates, suggesting exposure to cats did not increase their risk of acquiring *T gondii* infection.³⁰ Cats that are infected by *T gondii* usually do not shed or shed lower numbers of oocysts on secondary exposure,³¹ and in one experimental study did not have repeat oocyst shedding after being administered ciclosporin.³² (See **Panelists' advice 6** and **7**.)

Panelists' advice (6)

The Panelists believe cats that are positive for *T gondii* antibodies are unlikely to be a direct public health risk.

Panelists' advice (7)

To avoid ingestion of viable *T gondii* tissue cysts in food for human consumption, the Panelists recommend following the CDC guidelines (cdc.gov/parasites/toxoplasmosis/prevent.html). Based on the temperature measured by food thermometer in the thickest part of the meat, whole cuts of meat (excluding poultry) should be cooked to at least 145°F (63°C), ground meat (excluding poultry) to at least 160°F (71°C) and all poultry products to at least 165°F (74°C).

To avoid exposure to *T gondii*-sporulated oocysts, remove feces from the litter box daily, do not allow cats to hunt or eat undercooked meat, carefully wash or cook produce, filter, boil or chemically treat water from the environment prior to ingestion, and thoroughly wash hands after working with soil or handling undercooked meat.

Enteric zoonotic agent prevalence rates that have been reported in several studies of cats are generally higher in young cats with diarrhea.^{24–26,33} However, most of the agents can still be present even if the stool is normal. These findings emphasize that diagnostic work-ups for enteric infections are indicated due to potential human health risks. (See **Panelists' advice 8**.) For cats with persistent small bowel diarrhea after treatment for

Panelists' advice (8)

The Panelists recommend that the minimal diagnostic plan to assess for enteric zoonoses in cats with acute diarrhea includes a fecal flotation and a *Giardia* species antigen assay or immunofluorescent assay.

giardiasis, immunofluorescent assay or PCR for *Cryptosporidium* species is indicated. Fecal bacterial culture should be considered if fever is present and *Salmonella* species or *Campylobacter* species are on the differential list.^{34,35} However, fecal bacterial culture and measurement of *Clostridium* species enterotoxins had limited diagnostic value as routine tests in cats with diarrhea in one study.³³ (See **Panelists' advice 9**.)

Panelists' advice (9)

Because of the risk of inducing antimicrobial resistance and prolonged bacterial shedding, the Panelists recommend that normal cats or cats with diarrhea but no evidence of sepsis that are found to have *Salmonella* species or *Campylobacter* species should not be treated with oral antibiotics.²²

Gastrointestinal signs of enteric bacterial infections generally resolve with supportive care such as use of therapeutic diets and probiotic administration. Antibiotics should only be considered if these cats have fever or other evidence of bacteremia or sepsis; and, if believed to be necessary, should only be administered parenterally.

Scratch, bite or exudate exposure zoonoses

Approximately 1% of emergency room visits per year in the USA are to evaluate people bitten by animals.³⁶ Most of the aerobic and anaerobic bacteria associated with bite or scratch wounds (eg, *Pasteurella* species, *Staphylococcus* species) cause cellulitis in immunocompetent individuals. Approximately 28–80% of cat bites become infected, and severe sequelae including meningitis, endocarditis, septic arthritis, osteoarthritis and septic shock can occur.³⁷ Immunodeficient humans or humans exposed to *Pasteurella* species, *Capnocytophaga canimorsus* or *Capnocytophaga cynodegmi* more consistently develop systemic clinical illness.^{38–40} Splenectomized humans, as well as those with non-functional spleens, such as in sickle cell disease, are at increased risk of developing overwhelming sepsis/purpura fulminans with *Capnocyto-*

Panelists' advice (10)

The Panelists recommend that pet owners seek medical advice for all cat bites and deep cat scratches, particularly if any form of immunodeficiency is potentially present. The Panelists also recommend that veterinary staff members teach all owners techniques to avoid being bitten or scratched by cats, and that both general and feline practitioners consider acquiring additional training in how to be a Cat Friendly Practice (catvets.com/cfp/veterinary-professionals) and utilize feline friendly handling practices.⁴² The Panelists do not support declawing as a means to lessen scratch-associated zoonoses. If concerns exist in the family, claw covers can be considered. The AAEP also provides scratching educational resources (catvets.com/content/scratching-resources/scratching-education).

Table 2 Potential scratch, bite or exudate associated zoonotic agents of cats		
Agent	Principal clinical syndromes	
<i>Bartonella</i> species (bacterium)*	Cats	Subclinical infection, fever, hyperglobulinemia, uveitis, lymphadenopathy, others
	Humans	Immunocompetent: focal lymphadenopathy, fever including fever of unknown origin, encephalopathy, osteomyelitis, polyarthritis, headaches ⁴ Immunocompromised: bacillary angiomatosis, bacillary peliosis, others
<i>Capnocytophaga canimorsus</i> (bacterium)	Cats	Subclinical oral colonization
	Humans	Bacteremia including fulminant sepsis/purpura fulminans in asplenic individuals
Dermatophytes (fungi)	Cats	Superficial dermatologic disease
	Humans	Superficial dermatologic disease
<i>Francisella tularensis</i> (bacterium) [†]	Cats	Fever, lymphadenopathy, septicemia, pneumonia
	Humans	Ulceroglandular, oculoglandular, glandular, pneumonic or typhoidal (depending on route of inoculation)
Rabies (virus)	Cats	Rapidly progressive fatal encephalitis
	Humans	Rapidly progressive fatal encephalitis
<i>Sporothrix</i> species (fungi)	Cats	Draining cutaneous tracts
	Humans	Draining cutaneous tracts
<i>Yersinia pestis</i> (bacterium)	Cats	Bubonic, bacteremic or pneumonic (depending on route of inoculation)
	Humans	Bubonic, bacteremic or pneumonic (depending on route of inoculation)
[*] <i>Bartonella henselae</i> , <i>Bartonella koehlerae</i> and <i>Bartonella clarridgeiae</i> are transmitted among cats by <i>Ctenocephalides felis</i> and so are also listed under flea-borne disease (Table 5). There are other <i>Bartonella</i> species with zoonotic implications. Cats generally develop a higher level of bacteremia than dogs and so are epidemiologically linked more frequently to human disease. The vectors are unknown for some <i>Bartonella</i> species [†] <i>F. tularensis</i> can be acquired by direct contact with a bacteremic cat but is also vector borne		

There is no evidence that supports testing or treating healthy cats for *Bartonella* species infection if all family members are presumed to be immuno-competent.



phaga species infection.⁴¹ (See **Panelists' advice 10**.) Techniques to lessen feline stress to help protect staff members and owners, such as the use of pheromones or appropriate sedation, should be considered for cats, as required.^{42,43} Primary care physicians need to be aware of the potentially serious sequelae of untreated cat bites and scratches.

Bartonella species infection of humans can be associated with bites and scratches, and these agents are also vector-associated zoonoses (Tables 2 and 5; also see box on page 1016). It is known that *Bartonella* species (particularly *Bartonella henselae*), the cause of cat scratch disease, peliosis hepatis, bacillary angiomatosis, bacterial endocarditis and a number of other human inflammatory syndromes such as polyarthritis, are present in the oral cavity, on the skin and on the claws of cats with *Ctenocephalides felis* infestations.^{4,44-46} Veterinary healthcare providers may be at greater risk of development of *Bartonella* species-associated syndromes from exposure to cats or infected *C. felis*.⁴⁷ Consistent use of flea control products has been shown in a *B. henselae* (cat scratch agent) model to block transmission of the pathogen among cats.^{48,49} (Thus, see **Panelists' advice 11**.) Currently, no drugs can consistently eliminate the *Bartonella* species carrier state from healthy

Panelists' advice (11)
The Panelists believe that flea control products should be recommended for all cats. Since fleas commonly live in the human environment, the Panelists support the CAPC recommendation (capcvet.org) that prevention is indicated in all seasons and for cats housed indoors as well as outdoors.

Panelists' advice (12)
The Panelists support the CDC recommendation that there is no general indication for testing or treating healthy cats for *Bartonella* species infection.⁹

cats and antibiotics like azithromycin can rapidly select for resistant strains.⁵⁰ (Thus, see **Panelists' advice 12**.) However, in some circumstances the veterinarian and physician may choose to test cats in contact with immunosuppressed people in a family or those with clinical manifestations of bartonellosis.

Francisella tularensis (tick-borne agent) and *Yersinia pestis* (rodent fleas) infections can also be associated with bite wounds, but are not as common in humans as *Bartonella* species-associated infections (Tables 2 and 5, also see box on page 1016).⁵¹⁻⁵³ Of the many fungal agents that infect both humans and animals, *Sporothrix* species (Figure 2) and the dermatophytes (Figure 3) appear to be the most common to infect humans upon direct exposure.^{7,8,54} *Histoplasma*, *Blastomyces*, *Coccidioides*, *Aspergillus* and *Cryptococcus* species infections of humans and animals can occur in the same household, but infection of humans generally results from a



Figure 2 Cutaneous sporotrichosis in a young adult cat

Panelists' advice (13)

The Panelists recommend that all cats with skin disease, especially if draining tracts (sporotrichosis) or lesions consistent with dermatophytes are present, should be evaluated for fungal infections. If an owner has characteristic dermatophyte lesions, the Panelists recommend that the cats in the household be evaluated by culture, even if lesions are not clinically apparent.

common environmental source rather than direct contact with an infected animal. (See **Panelists' advice 13.**)

Cats can harbor methicillin-resistant *Staphylococcus aureus* (MRSA) and *Staphylococcus pseudintermedius*, and transmission between animals and humans is likely to occur within households.^{55–57} Unlike other infections discussed in these Guidelines, MRSA in cats is generally acquired from humans and is considered a 'reverse zoonosis' or 'humanosis'. (See **Panelists' advice 14.**)

Panelists' advice (14)

The Panelists recommend using the World Association for Veterinary Dermatology guidelines⁵⁸ when cats with suspected resistant *Staphylococcus* species are encountered.

Although uncommon in cats, rabies is still the only significant small animal viral zoonosis in the USA and is associated with bite wounds.^{59,60} (See **Panelists' advice 15.**) While the feline retroviruses can be transmitted among cats by direct contact, including bites and scratches, one study of veterinarians showed no evidence of transmission.⁶¹

Panelists' advice (15)

The Panelists support recommendations of the 2013 AAFP vaccination guidelines panel and the American Association of Public Health Veterinarians on rabies vaccination of cats.^{59,60} For international recommendations, the WSAVA is a good source of information (wsava.org).

Physicians and veterinarians should work closely together with their clients to develop safe cat ownership plans.



Figure 3 Characteristic cutaneous ringworm lesion on the forearm of a veterinarian

Ocular or respiratory zoonoses

Bordetella bronchiseptica and *Chlamydia felis* cause mild respiratory disease in cats (Table 3).⁶² Cough is most common with *B bronchiseptica* infection and conjunctivitis with *C felis* infection. It is believed that *C felis* may be associated with conjunctivitis in people.^{63,64} Most people with *Bordetella* species infections are infected by *Bordetella pertussis*, but some individuals, particularly immunocompromised people, can be infected with *B bronchiseptica*.^{65,66}

Cats with cough and systemic evidence of bacterial infection such as fever might occasionally be infected with *Y pestis* and/or *F tularensis*, if living in endemic areas; these agents can be transmitted from cats to humans in respiratory secretions.^{53,67,68} (See **Panelists' advice 16.**)

Panelists' advice (16)

The Panelists recommend that all outdoor cats with fever, cough or dyspnea be handled carefully as potential sources of *Y pestis* or *F tularensis* until a diagnostic work-up has been completed, particularly if the cats have a history of hunting in areas endemic for these agents.⁶²

Humans are the principal natural hosts for *Streptococcus* group A (*Streptococcus pyogenes*) bacteria, which cause 'strep throat' in people. Cats in close contact with infected humans can develop transient, subclinical colonization of pharyngeal tissues and can transmit the infection to other humans. Older data suggested this was a common occurrence; however, with improved diagnostics it has been shown to be an uncommon event. Early studies used crude antimicrobial data on bacitracin susceptibilities rather than genetic subtyping.^{69,70} Later, when Lancefield typing was performed, the true prevalence in household pets was found

Table 3 Potential ocular or respiratory zoonotic agents of cats		
Agent	Principal clinical syndromes	
<i>Bordetella bronchiseptica</i> (bacterium)	Cats Humans	Subclinical infection or sneeze and cough Prolonged cough or pneumonia, particularly in immunocompromised individuals
<i>Chlamydia felis</i> (bacterium)	Cats Humans	Conjunctivitis, sneezing Conjunctivitis
<i>Francisella tularensis</i> (bacterium)*	Cats Humans	Fever, lymphadenopathy, septicemia, pneumonia Ulceroglandular, oculoglandular, glandular, pneumonic or typhoidal (depending on route of inoculation)
Influenza (virus; H7N2, H5N1, others)	Cats Humans	Subclinical infection or sneeze and cough Rare from cat exposure; mild and self-limited
<i>Streptococcus</i> group A (bacterium)	Cats Humans	Subclinical infection, transient carrier 'Strep throat', septicemia
<i>Yersinia pestis</i> (bacterium)*	Cats Humans	Bubonic, bacteremic or pneumonic (depending on route of inoculation) Bubonic, bacteremic or pneumonic (depending on route of inoculation)
*Also can be vector borne		

to be only 0–3% and not correlated with the presence of infection in the owner, and hence the risk for transfer of infection from pet cats to humans is considered low.⁷¹

Avian influenza viruses occasionally infect cats.^{72,73} Rarely, cats infected with an influenza virus are associated with clinical disease in humans.⁷⁴ Recently, an H3N2 vaccine for dogs marketed in the USA was approved for use in cats (Merck Animal Health, New Jersey, USA) and a different canine vaccine was shown to induce H3N2 immune responses in cats.⁷⁵ Whether these vaccines are indicated for use in cats to lessen human exposure in the USA is currently unknown. (See **Panelists' advice 17.**)

Urogenital tract zoonoses

Coxiella burnetii (Table 4) is a rickettsial agent found throughout the world that is associated with Q fever.^{76,77} Many ticks, including *Rhipicephalus sanguineus*, are naturally infected with *C burnetii* and so this agent is considered to be a shared vector zoonosis. While

abortion can occur, cats infected by *C burnetii* usually do not show clinical signs of disease. *C burnetii* DNA was amplified from 8.5% of uterine biopsies taken after elective ovariohysterectomy in a small study of cats in Colorado, USA.⁷⁸ Human illness associated with close contact with infected cats occurs after aerosol exposure to the organism passed by parturient or aborting cats; clinical signs develop 4–30 days after contact.⁷⁹ Humans commonly develop acute clinical signs similar to those associated with other rickettsial diseases, including fever, malaise, headache, pneumonitis, myalgia and arthralgia. (See **Panelists' advice 18.**)

Panelists' advice (18)
The Panelists recommend that veterinarians wear gloves and masks when attending to parturient or aborting cats and handle uterine tissues carefully. People who develop fever or respiratory tract disease after exposure to parturient or aborting cats should seek medical attention and discuss Q fever with their physician.

The major agents associated with urine that could be a direct feline zoonosis are the *Leptospira* species.⁸⁰ These spirochetes can be transmitted in urine to humans and result in clinical disease. While *Leptospira* species antibodies and DNA have been detected in cats, the role these agents play in leptospirosis of people is unclear.^{81–83} (See **Panelists' advice 19.**)

Table 4 Potential urogenital zoonotic agents of cats		
Agent	Principal clinical syndromes	
<i>Coxiella burnetii</i> (rickettsia)	Cats Humans	Subclinical infection, abortion or stillbirth Fever, pneumonitis, lymphadenopathy, myalgia, arthritis
<i>Leptospira</i> species (spirochetes)	Cats Humans	Subclinical infection; link to inflammatory urinary tract or hepatic disease is unclear Fever, malaise

Panelists' advice (19)
The Panelists recommend that cats with leptospirosis on the differential list be handled as described by the ACVIM for dogs with suspected leptospirosis.⁸⁰

Cats with no clinical evidence of gastrointestinal, ocular, respiratory, skin or urogenital tract disease that are being administered internal and external parasite control are unlikely to be a zoonotic risk to their owners.

Vector-borne zoonoses

There are multiple infectious agents potentially transferred from cats to humans by fleas and ticks (Table 5). *C felis* from cats contain multiple pathogens, with *Bartonella* species and *R felis* being the most common.^{46,84,85} (See the scratch, bite or exudate exposure section on pages 1011–1013 for more information about *Bartonella* species.) *R felis* can cause mild clinical signs of disease including fever and malaise.⁸⁶ While *C felis* and ticks collected from cats or dogs are commonly positive for *R felis* DNA, it appears the dog is the better reservoir.⁸⁷ It is possible that *C burnetii* and *Y pestis* could be transmitted to humans from cats with fleas. Humans can also be infected by *Dipylidium caninum* by accidental ingestion of infected fleas, which typically is reported in young children that spend time on the carpet where fleas usually reside when not on the host.⁸⁸ (See **Panelists' advice 20**.)

Recently, it was documented that pet ownership increases the risks for humans of



Panelists' advice (20)

Since fleas readily live within the human environment, the Panelists support the CAPC recommendation (capcvet.org) that flea control be provided to all cats year-round.

exposure to ticks.⁶ Cats have been shown to be infected experimentally and naturally with many tick-borne agents that could infect humans including *B burgdorferi* and *A phagocytophilum*.^{89–92} (Thus, see **Panelists' advice 21**.)

Panelists' advice (21)

The Panelists suggest the use of acaricides be recommended for cats allowed outdoors.

There are many more vector-borne diseases of potential significance in cats of the USA, including West Nile virus (mosquitoes) and *Leishmania* species.^{93,94} However, in contrast to the flea- and tick-associated zoonoses, cats are unlikely to influence exposure of these agents to owners in the USA. However, travel history from other countries should always be considered. For example, cats can harbor both Old World and New World *Leishmania* species. International guidelines (leishvet.org/fact-sheet-feline-leishmaniosis) are available to provide information about leishmaniosis and control for cats imported from endemic areas.

Table 5 Common flea- and tick-borne zoonotic agents of cats

Agent		Principal clinical syndromes	
Fleas*	<i>Bartonella</i> species (bacteria) [†]	Cats Humans	Subclinical infection, fever, hyperglobulinemia, uveitis, lymphadenopathy, others Immunocompetent: focal lymphadenopathy, fever including fever of unknown origin, encephalopathy, osteomyelitis, polyarthritis, headaches ⁴ Immunocompromised: bacillary angiomatosis, bacillary peliosis, others
	<i>Rickettsia felis</i> (rickettsia)	Cats Humans	Subclinical infection Fever and rash, central nervous system (CNS) disease
	<i>Yersinia pestis</i> (bacterium)	Cats Humans	Bubonic, bacteremic, or pneumonic (depending on route of inoculation) Bubonic, bacteremic, or pneumonic (depending on route of inoculation)
	<i>Anaplasma phagocytophilum</i> (rickettsia)	Cats Humans	Subclinical infection; rarely fever, lethargy, discomfort Fever, headache, muscle pain, other signs of polysystemic inflammation ⁵
Ticks	<i>Borrelia burgdorferi</i> (spirochete)	Cats Humans	Subclinical infection; whether fever, nephritis or polyarthritis occur in cats is unclear Rash (erythema migrans), polyarthropathy, cardiac or CNS disease
	<i>Ehrlichia</i> species (rickettsia)	Cats Humans	Subclinical infection, fever, polysystemic signs Fever, polysystemic signs
	<i>Francisella tularensis</i> (bacterium)	Cats Humans	Fever, lymphadenopathy, septicemia, pneumonia Ulceroglandular, oculoglandular, glandular, pneumonic or typhoidal (depending on route of infection)
	Other spotted fever <i>Rickettsia</i> species (rickettsia)	Cats Humans	Subclinical infection; whether fever or polysystemic signs occur in cats is unclear Fever, polysystemic signs

**Coxiella burnetii* DNA has been amplified from *Ctenocephalides felis* in Cyprus, but whether this flea is a vector is unknown

[†]*Bartonella* species DNA has been amplified from some ticks, but the extent of the role ticks play in the transmission of these agents has not been fully ascertained

Lessening the risk of zoonotic transfer of disease from cats

General guidelines for veterinary staff members

- ❖ Veterinary staff members should familiarize themselves with zoonotic issues and take an active role in discussing the health risks and benefits of cat ownership with clients so that logical decisions concerning ownership and management of individual cats can be made
- ❖ Veterinary staff members should teach all owners techniques to avoid being bitten or scratched by cats, and consider becoming a Cat Friendly Practice (catvets.com/cfp/veterinary-professionals)
- ❖ Veterinary staff members should make it clear to owners that they understand conditions associated with human immune deficiency, are discreet, and are willing to help; signs or posters can be effective for this purpose
- ❖ Rabies vaccination should be recommended for all cats in the USA
- ❖ Drugs that control hookworms and roundworms should be recommended for all cats
- ❖ Flea and tick control products should be recommended for all cats
- ❖ Veterinary staff members should provide cat owners with information concerning veterinary or public health aspects of zoonoses, but should not diagnose disease in humans or discuss specific treatments
- ❖ Veterinary staff members should always refer owners of clinically ill cats with a suspected zoonotic infection to a physician for additional information and treatment
- ❖ Veterinarians should volunteer to speak to the cat owner's physician to clarify zoonotic issues when indicated
- ❖ When veterinary staff members offer public health-related advice, it should be documented in the medical record
- ❖ When reportable zoonotic diseases are diagnosed, appropriate public health officials should be contacted
- ❖ Diagnostic plans to assess for the presence of organisms with zoonotic potential should be offered, particularly to owners with clinically ill cats
- ❖ Veterinary staff members should avoid needle sticks contaminated with blood or effusions

General guidelines for cat owners

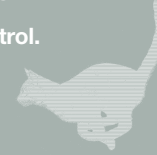
- ❖ Veterinary care should be sought for all clinically ill cats
- ❖ Physical examination and fecal examination should be performed at least once or twice yearly
- ❖ Strategic deworming as recommended by a veterinarian should be used for all cats*
- ❖ Cats should be maintained within the home environment to lessen exposure to: other animals that may carry zoonotic agents; excrement of other animals; and fleas and ticks.[†] Although living indoors only decreases (rather than eliminates) a cat's risk of exposure to zoonotic agents, if an owner allows a cat outdoor access, the veterinarian should provide information concerning zoonotic risks and how to decrease them
- ❖ Flea preventives recommended by a veterinarian should be used for all cats[‡]
- ❖ Acaricides recommended by a veterinarian should be used for all outdoor cats[‡]
- ❖ Fecal material produced in the home environment should be removed daily, preferably by someone other than an immunocompromised individual*
- ❖ Litter boxes should be washed with soap and water intermittently, when soiled, preferably by someone other than an immunocompromised individual
- ❖ Cats should not be allowed to drink from the toilet
- ❖ Wear gloves when gardening and wash hands thoroughly when finished
- ❖ Filter or boil water from sources in the environment
- ❖ Wash hands after handling cats
- ❖ Do not handle cats that you are unfamiliar with
- ❖ Clinically ill cats should not be handled by immunocompromised people, if possible
- ❖ Cats should only be fed commercially processed food
- ❖ Food utensils should not be shared with cats
- ❖ Avoid being licked by cats
- ❖ Claws of cats should be clipped frequently to lessen the risk of skin penetration
- ❖ To lessen the risk of bites and scratches, do not tease or physically restrain cats
- ❖ If bitten or scratched by a cat, seek medical attention
- ❖ Control potential transport hosts, such as flies and cockroaches, that may bring zoonotic agents into the home
- ❖ When used for human consumption, whole cuts of meat (excluding poultry) should be cooked to at least 145°F (63°C), ground meat (excluding poultry) to at least 160°F (71°C) and all poultry products to at least 165°F (74°C), based on the temperature measured by food thermometer in the thickest part of the meat*
- ❖ Wear gloves when handling meat and wash hands thoroughly with soap and water when finished
- ❖ If a new cat is to be adopted into a household with an immunocompromised family member, the cat least likely to be a zoonotic risk is a clinically normal, arthropod-free, adult animal from a private family
- ❖ Once the cat to be adopted is identified, it should be quarantined from any immunocompromised person until a thorough physical examination and zoonoses risk assessment have been performed by a veterinarian

*See the enteric zoonosis section on pages 1010–1011

[†]See the AAFP's position statement on lifestyle choice for further information (catvets.com/guidelines/position-statements/lifestyle-choice-position-statement)[‡]See the vector-borne diseases section on page 1015

SUMMARY POINTS

- ❖ While humans are rarely infected with a zoonotic agent by exposure to a healthy cat, there are many potential infections that can occur.
- ❖ Disease is generally more prevalent or more severe in people with immunodeficiency-inducing disorders, the very old, very young, individuals receiving chemotherapy or glucocorticoids for immune-mediated diseases, organ transplant recipients and cancer patients.
- ❖ Cats should have consistent deworming and should be prescribed vector control.
- ❖ Cats with clinical signs of disease should be assessed by a veterinarian to determine the risk of zoonotic disease transmission and to have the clinical abnormalities treated.



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Conflict of interest

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Appendix: Client brochure

What Can I Catch from my Cat?

Feline Zoonoses

Download in
easy-to-print
brochure formats at
[www.catvets.com/
guidelines/
client-brochures](http://www.catvets.com/guidelines/client-brochures).



You are an important member of your cat's healthcare team.
You are instrumental in helping with the success of treatments and improved healthcare for your cat.

What Can I Catch from my Cat?

Feline Zoonoses



Zoonotic diseases (zoonoses) are illnesses that sometimes develop after being exposed to infectious organisms that are passed between animals and people. Some bacteria, viruses, parasites, prions (misfolded proteins), and fungi can be zoonotic and make people sick. There are many precautions that you can take to minimize the risk of exposure to zoonotic organisms. It is important to note that a cat can be carrying one of these organisms but not show any visible signs of sickness. In some situations, people can be a source of infection for a cat (reverse zoonoses).

HOW ARE ZOOBOTIC ORGANISMS SPREAD?

Zoonotic organisms can be acquired from direct contact with infected cats, contact with contaminated food or water, from vectors (i.e. fleas, mosquitoes or ticks), or from the shared environment. The organisms can be spread through a variety of means including:

- Saliva
- Bites or scratches
- Respiratory secretions (i.e. cough, nasal discharge, mucus)
- Skin or hair
- Feces
- Urine
- Vectors (i.e. fleas, mosquitoes or ticks)



WHO IS AT RISK?

Zoonotic diseases are often more severe in people who have a weak or compromised immune system such as those being treated for cancer or those undergoing an organ transplantation. However, some zoonotic organisms, like the rabies virus, can cause illness in humans regardless of a person's immune status. Therefore, precautions and preventive measures should always be taken to avoid direct or indirect exposure.

EXAMPLES OF POTENTIAL CAT-ASSOCIATED ZOOBOTIC DISEASES

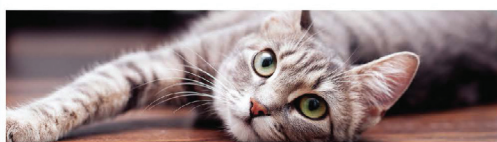
There are many zoonotic organisms that can be shared between cats and people. The following are several examples:

Cat scratch fever *Bartonella* spp. are the bacteria that cause fever and enlarged lymph nodes that frequently develop near a cat bite or scratch. The organisms are passed in flea feces which can then contaminate the cat's hair, claws, or mouth. This agent can also cause other inflammatory diseases similar to those caused by Lyme disease. This zoonosis is avoided by using strict flea control, and avoiding bites and scratches from cats.

Gastrointestinal (GI) agents A number of parasites (i.e. some tapeworms, roundworms, hookworms, or some strains of *Giardia*) and bacteria (i.e. *Salmonella*) are passed in feces. The zoonotic risk is greatest if the cat has diarrhea. These agents can be largely avoided by:

- routinely deworming your cat
- washing your hands frequently after handling cats
- cleaning the litterbox every day
- avoiding handling soil or produce that could be contaminated with cat feces
- not allowing your cat to hunt live prey
- feeding your cat high-quality commercial food

Ringworm This fungus can infect cat hair shafts, which can then contaminate the environment or infect a human. Infected cats may or may not have problems with their hair or skin. If a family member develops skin lesions your cat(s) should be evaluated by your veterinarian for this infection.



This was developed from the 2019 AAFP Feline Zoonoses Guidelines. © Copyright 2019 AAFP. All rights reserved.

Rabies This deadly virus is shed in the saliva of infected animals, including cats. Rabies is commonly transmitted by bites and is 100% preventable through vaccination. New feline rabies vaccines have minimal side effects and can protect your cat and family.

Toxoplasmosis Only cats can pass the *Toxoplasma gondii* parasite in feces. The parasite becomes infectious after about 24 hours in the environment, which is why it is recommended to clean the litterbox every day to reduce risk. Most cats only shed the organism for about 10 days and usually do not leave feces on their body, and so the risk of acquiring this infection from touching your cat is extremely low. Most human exposures occur from ingesting the parasite in the environment, where it can live for up to 18 months. This is why you should wash your hands after gardening, thoroughly wash your produce, and avoid drinking unfiltered water from the environment. Toxoplasmosis can also be acquired by eating undercooked meat. Most people exposed to the parasite never develop signs of toxoplasmosis. The greatest risk is to the fetus of pregnant women and those with severe immune deficiency.

DECREASE YOUR RISK

Sick cats are more likely than healthy cats to pass zoonotic agents. So, the most important thing you can do to avoid zoonotic disease agents is to bring your sick cat to the veterinarian for diagnostic tests and treatments.

Annual physical checkups and wellness visits are imperative so that you and your veterinarian can develop an individualized plan to optimize the health of your cat and lessen the risk of you and your family acquiring a zoonosis.

Here is a summary of the most important things you can do to lessen the risk of contracting a zoonotic disease:

- Administer the optimal internal parasite products recommended by your veterinarian to all cats, including those living indoors. Flies, cockroaches, and mosquitoes can still gain access to even the most well-secured house.
- Administer the optimal flea and tick control products recommended by your veterinarian to lessen the risk for disease like cat scratch fever or Lyme disease. These agents can unknowingly be brought into the home by you or another pet.
- Litter boxes should be scooped at a minimum of once per day. Wash your hands after each contact with the litter box and wash the litter box every 1-4 weeks using soap and hot water.
- Sometimes animals defecate in dirt or plant beds. Wear gloves when gardening and wash hands thoroughly when finished.
- Cats should not consume raw foods, raw diets, or undercooked foods. Do not share food utensils with cats.
- Claws should be trimmed frequently to lessen the risk of deep scratches; claw covers can be considered.
- If bitten or scratched by a cat, seek medical attention.
- Good hygiene should always be maintained with pets. Wash your hands with soap and water after petting cats, cleaning food or water bowls, and after scooping litter.
- Stray cats are best handled only by appropriately trained professionals.
- If adopting a new cat, it should be quarantined from other cats and any immunocompromised person until a thorough physical examination and zoonosis risk assessment is performed by a veterinarian.
- Discuss any human-related healthcare concerns with your veterinarian who can help liaise with your healthcare provider, especially if you are aware of any potential immunocompromised individuals in your household.

Through preventive care, it is possible to decrease the risk of exposure to many of these zoonoses.

For more information on feline zoonoses, visit www.catfriendly.com/zoonoses.

For more information on cat scratching, visit catfriendly.com/scratching.