



2017 Veterinary Advisory #2

Summary of Canine Leptospirosis Surveillance in New York City, 2014-2016

- On average, 14 canine leptospirosis cases per year were identified from 2014-2016.
- The most commonly reported serovars with elevated titers were *L. icterohaemorrhagiae*, *L. bratislava*, and *L. grippityphosa*.
- Risk factors for infection included observing rodents, raccoons or other wildlife in the vicinity of the residence or recreational area, and exposure to puddles of water.
- Leptospirosis transmission from dogs to humans is rare and has not been reported in NYC.

Please share with your colleagues in Veterinary Medicine, Animal Health and your staff.

April 6, 2017

The New York City (NYC) Department of Health and Mental Hygiene (DOHMH) conducts active laboratory and passive veterinary surveillance for canine leptospirosis as a complement to human leptospirosis surveillance, and to help identify clusters or outbreaks of disease.

This advisory summarizes the most recent surveillance findings from 2014-2016. Results from previous years were summarized in Veterinary Alerts and Newsletters, available on the NYC DOHMH Zoonotic and Vectorborne Diseases website:

http://www1.nyc.gov/site/doh/providers/resources/zoonotic_vectorborne_publications.page.

(2011-2013, see Veterinary Alert 2014 #6; 2009-2010, see Veterinary Alert 2011 #2; 2006-2008, see Spring 2007, Fall 2008, and Spring 2009 issues of Zoonotic and Vector-borne Public Health Newsletter).

Surveillance Methodology and Results

Laboratory reports of *Leptospira* titers $\geq 1:800$ or positive PCR and case reports from veterinarians are investigated by interviewing the veterinarian and dog owner. The NYC canine leptospirosis case definition was developed for surveillance purposes only:

Confirmed Case: Clinically compatible presentation and positive PCR or 4-fold change between acute and convalescent titers, taken approximately 2 weeks apart

Probable Case: Clinically compatible presentation and single elevated titer or positive antibody test

In 2014-2016, 63 reports were investigated, mostly (n=54, 86%) laboratory reports. Veterinarians submitted 9 reports (14%), including one also reported by the laboratory, and one reported during the course of another investigation. Forty-two dogs met the case definition (15 confirmed, 27 probable). One report was unresolved and the rest were not classified as cases due to other illness (n=13, including 8 dogs with recent vaccination), incompatible lab results (n=6), or residence outside NYC (n=1).

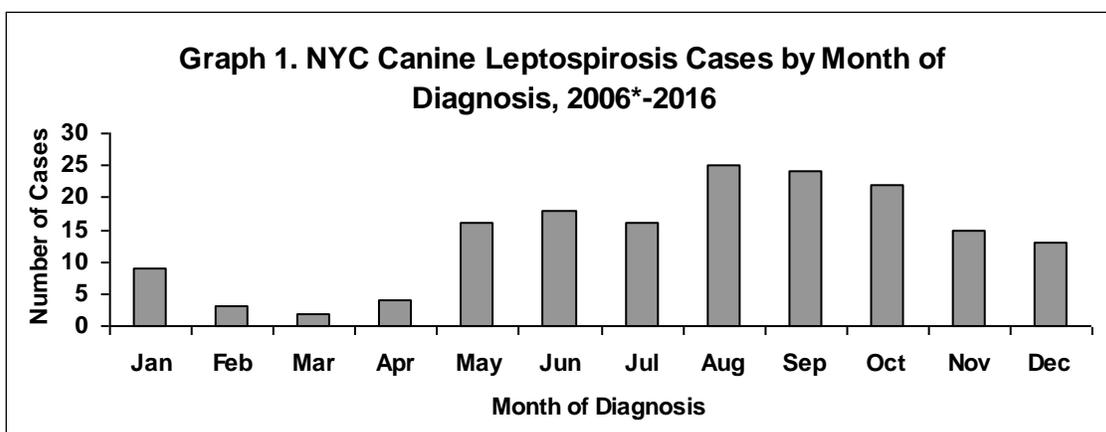
The majority of the 42 cases occurred in dogs living in Brooklyn (n=17, 40%) and Manhattan (n=11, 26%) (Table 1). There was a general seasonal pattern, with most cases diagnosed between May and October (Graph 1) but 2015 cases peaked in the summer while cases in 2014 and 2016 cases peaked in the fall. Case characteristics

included 67% male, 76% neutered or spayed, and 47% small-breed dogs (<20 lbs.). The most commonly reported breeds were pit bull (n=8, 20%) and Chihuahua/ Chihuahua mix (n=3, 7%). The median age of cases was 4.8 years, ranging from 6 months to 16 years.

Most leptospirosis cases were hospitalized (n=34, 81%); the average hospital stay for dogs treated and released was 4.7 days (range 2-14 days). Thirteen dogs (31%) died or were euthanized; the average length of hospitalization for fatal cases was 3.8 days (range 1-9 days). The most commonly reported symptoms were anorexia (69%), vomiting (67%), lethargy (50%), polyuria/polydipsia (41%), fever (26%), and icterus (24%). Renal (79%) and liver (74%) failure were the most common complications.

Table 1. NYC Canine Leptospirosis Cases by Borough of Residence and Year, 2006*-2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Bronx	2	2	0	0	2	2	2	2	1	1	0	14
Brooklyn	2	4	6	4	3	8	5	4	5	6	6	53
Manhattan	4	6	2	5	6	8	13	9	3	4	4	64
Queens	1	3	0	4	1	0	4	1	3	4	2	23
Staten Island	0	1	0	4	1	0	3	1	0	0	3	13
Total	9	16	8	17	13	18	27	17	12	15	15	167



*Reporting began June 2006

Exposures

Interviews with dog owners about exposures to potential sources of leptospirosis were completed for 33 (79%) cases and partial exposure information was provided by the veterinarian for 8 (19%) cases whose owners could not be reached. Among 39 dogs with a known travel history, the majority (n=30, 77%) did not travel and acquired their infection in NYC. Nine cases traveled outside NYC (NY state [n=6], PA [n=3]). Two of the cases with travel to upstate NY also had rodent exposures near home. The remainder of the analysis focuses on the 32 cases that definitely or likely acquired their infections in NYC.

Most (n=22, 76%) of the leptospirosis cases likely acquired in NYC were exposed to environments with animals that can harbor leptospires. Dog owners of 3 cases reported exposure to puddles after rain, and 6 cases were exposed to both animals and standing water (Table 2). Among cases with animal exposures, rodents (n=18, 86%), primarily rats, were the most commonly observed animal by dog owners either at home or where the dog was walked. Four of these cases had direct contact with rats during the incubation period. Other observed animals were raccoons (n=4) and opossums (n=2) (3 cases exposed to >1 animal species).

Table 2. Locally Acquired NYC Canine Leptospirosis Cases by Exposure Source, 2014-2016

Exposure Source	2014	2015	2016	Total
Animal	2	6	8	16
Animal and Water	2	3	1	6
Water	0	2	1	3
Unknown	2	1	4	7
Total	6	12	14	32

Leptospira Serovars

Leptospira serovars can help identify the animal reservoir host(s) responsible for infection. The serovar analysis excludes 3 cases diagnosed by PCR and 2 by antibody tests. Most cases had elevated titers to more than one serovar since cross-reactivity is common on the microscopic agglutination test (MAT), which is specific to the serogroup but not the serovar. Among cases for which a single serovar had the highest titer, the most common were *L. icterohaemorrhagiae* (n=12, 52%), *L. grippityphosa* (n=7, 30%), and *L. bratislava* (n=3, 13%).

For the majority of leptospirosis cases likely acquired in NYC, the primary serovar, or serovar(s) with the highest titer or highest change in titers, was *L. icterohaemorrhagiae* and/or *L. bratislava* (n=17, 63%), both of which are associated with rodents (Table 3). Eight cases (25%) had the primary serovar *L. grippityphosa*, associated with raccoons, opossums, and skunks, including one with matching titers to *L. pomona*. To better assess whether animal exposures were consistent with the infecting serovar, the primary serovar(s) was used to classify cases into a serovar group based on the primary animal reservoir host(s) (Table 3). Most of the dogs in Group 1 were exposed to rodents (n=14, 82%), the animal host associated with the serovars. Fewer dogs with *L. grippityphosa* were exposed to the associated animal hosts (n=3, 38%). Interestingly, previous serovar testing of a sample of NYC raccoons in 2010 showed most were infected with *L. icterohaemorrhagiae* rather than the expected *L. grippityphosa* (unpublished data).

Table 3. Serovar Group and Exposures of Locally Acquired NYC Canine Leptospirosis Cases, 2014-2016

Serovar Group (Serovar(s) with highest titer)	Exposure				Total
	Rodents	Raccoons or other wildlife	Rodents and raccoons/other wildlife	No animal exposures	
Group 1 <i>L. icterohaemorrhagiae</i> and/or <i>L. bratislava</i> (rodents)	14	0	1	2	17
Group 2 <i>L. grippityphosa</i> (raccoons, skunks, opossums)	1	2	1	4	8
Group 3 <i>L. icterohaemorrhagiae</i> and/or <i>L. bratislava</i> and <i>L. grippityphosa</i>	1	0	0	0	1
Group 4 Other (<i>L. autumnalis</i>)	0	0	0	1	1
Total	16	2	2	7	27*

*5 cases diagnosed by PCR or antibody test excluded from serovar analysis

Clusters

Two clusters of 2 cases each were identified. In August 2015, 2 dogs in the same household in Brooklyn had direct contact with a rat on their block and were both infected with *L. icterohaemorrhagiae*. In December 2016, 2 fatal cases occurred within 1 week in the same zip code in the Washington Heights neighborhood of Manhattan. The primary serovars of these cases were *L. icterohaemorrhagiae* and *L. icterohaemorrhagiae/bratislava*. Both dogs resided in known rat reservoirs, previously treated by the DOHMH. In cases where a rodent problem is reported, the Bureau of Veterinary and Pest Control Services is typically

notified to follow up on rodent inspections. An additional household cluster of 2 dogs, one of whom died, was reported in 2014 but the owner could not be interviewed to determine exposures; one of the dogs was positive for *L. grippotyphosa*.



Conclusions

Surveillance findings were similar to the previous 3-year period (2011-2013). However, there was a 20% decrease in reports and a 33% decrease in cases. While leptospirosis is likely under-reported, the decrease may also be due to increased use of the in-house SNAP antibody test which is not routinely reported and does not identify serovars. The NYC DOHMH plans to conduct a survey of veterinarians on leptospirosis testing practices to help determine if changes in testing are a factor in the decrease in reports.

More cases were reported from Brooklyn than in previous years when Manhattan typically had the most cases but leptospirosis occurs in all 5 boroughs and this is likely reflective of more veterinary visits and testing compared to the other boroughs. The percent of fatal cases was almost twice that of the previous 3-year period.

Surveillance for canine leptospirosis is limited, in that reports are collected only from one lab, and asymptomatic cases are not captured. However, based on our findings, leptospirosis appears to be uncommon in NYC dogs. *Leptospira* bacteria die within minutes of exposure to dry environments, and outbreaks of leptospirosis tend to occur only in warm, moist environments. The cold winters of NYC likely limit the extent to which leptospires can survive in the environment, suggesting that most cases of leptospirosis are due to contact with an area or water source recently contaminated by an animal that is actively shedding leptospires. Infection most commonly occurs through contact with open wounds or mucous membranes with water, moist soil, or vegetation contaminated by the urine of infected animals. Other possible routes of transmission include swallowing contaminated water, direct contact with urine or tissues of infected animals, or inhalation of aerosolized contaminated fluids.

Human Leptospirosis Surveillance

Human leptospirosis is rarely diagnosed in NYC, with 0-6 cases reported annually. During the three years described in this report, 1 case was reported in 2014, 5 cases in 2015, and 8 in 2016; 7 of these 14 cases were associated with foreign travel. Most human cases acquired in NYC report rodent exposures or occupations where rodent exposure is common and have tested positive for rodent-associated serovars. Although infected dogs theoretically pose a risk of transmission to people through contact with their urine, such direct transmission has been infrequently documented in the literature, and based on the past 10 years of surveillance data, infected dogs have not been identified as a source of human infection in NYC.

Prevention

To help prevent transmission if you are treating an animal with suspected leptospirosis:

- Limit the number of staff members who have direct contact with the animal, its urine or its bedding.
- Post infection control signs for staff.
- Remind owners to use caution when handling the dog's urine, vomit, or blood, and wash hands.
- Use protective equipment or clothing, such as gloves and face shields, and minimize contact with urine, vomit, blood and contaminated materials.
- Clean contaminated porous and non-porous surfaces with routine disinfectants, soaps, or other household cleaning products. The *Leptospira* bacterium is susceptible to even low concentrations of these products.

Leptospirosis fact sheets for veterinarians and dog owners (also in Spanish, Russian, and Mandarin Chinese) are available on the NYC DOHMH website and copies may be ordered via 311:

http://www1.nyc.gov/assets/doh/downloads/pdf/zoo/lepto_providers.pdf

http://www1.nyc.gov/assets/doh/downloads/pdf/zoo/lepto_owners.pdf

Reportable Animal Diseases

As a reminder, the following diseases are reportable to DOHMH. Please use the Animal Disease Reporting Form, available at <http://www1.nyc.gov/assets/doh/downloads/pdf/zoo/zoo-disease-report-form.pdf>.

Upon laboratory diagnosis: leptospirosis, psittacosis, Rocky Mountain spotted fever, salmonellosis, tuberculosis, arboviral encephalitides

Upon suspicion: anthrax, brucellosis, rabies, tularemia, Q fever, glanders, monkeypox, plague, SARS (severe acute respiratory syndrome), novel influenza (with pandemic potential)

Contact: Bureau of Communicable Disease Phone: 347-396-2600 Fax: 347-396-2753

As always, we appreciate your partnership and cooperation.

Sincerely,

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