

Short Communication

Leptospira cases and vaccination habits within UK vet-visiting dogs

C. Ball, S. Dawson, N. Williams

CANINE leptospirosis is perceived to be underdiagnosed due to non-specific clinical signs (Prescott and others 1991, Sarkar and others 2012). In the UK, it is routinely diagnosed by serological testing via the microscopic agglutination test (Faine and others 1999), or immunofluorescent antibody test (Torten and others 1966, Appassakij and others 1995, Naigowit and others 2000). More recently, several PCR assays have been published for diagnosing suspected leptospirosis (Ahmed and others 2012, Picardeau 2013).

Close vicinity, or frequent contact with water or woodland, put canines at higher risk of contracting leptospirosis (Tangkanakul and others 2000, Ward and others 2004, Meeyam and others 2006, Raghavan and others 2012), as asymptomatic shedding from rodent reservoirs contribute to environmental loading of *Leptospira*.

This study aimed to investigate perceived and confirmed canine leptospirosis cases within UK vet-visiting dogs, along with details regarding vaccination habits, by surveying small animal veterinary practices.

A questionnaire survey targeted 472 practices randomly chosen from 23 stratified mainland UK regions (see online supplementary material for full questionnaire and covering letter). One vet per practice was targeted and sent reminder cards (with repeat questionnaires) two weeks following initial contact.

Suspected or confirmed cases within the past 12 months were investigated, including the last date a practice witnessed a case. To establish practice, vaccination habits, the number of *Leptospira* vaccine doses administered over the same 12 months, and estimation of what percentage of their case load were currently vaccinated was surveyed. Practice size was determined by the number of small animal vets employed and number of dogs seen per day. Clinical signs that respondents associated with leptospirosis diagnosis were also noted.

Full ethical consent was granted by the University of Liverpool ethics committee.

Eighty-nine questionnaires were returned completed, with a compliance rate of 18.86 per cent. Thirteen (14.61 per cent) reported suspected or laboratory-confirmed cases within the last 12 months (Table 1), of which five were laboratory confirmed. Interestingly, a single practice reported a confirmed leptospirosis case with a current vaccination.

Annual *Leptospira* vaccine doses administered differed extensively between practices (240 and 7000), with an overall mean of 1690.01. The overall estimated caseload with an up-to-date vaccination was 60.37 per cent. The mean number of vaccine doses administered over the previous 12 months in practices witnessing a suspected or

confirmed leptospirosis case was 1668, with mean vaccine protection of 58.77 per cent. Overall, mixed animal practices reported a higher mean number of doses (1692) compared with dedicated small animal practices (1653). Furthermore, there was a weak positive correlation between dogs seen per day and vaccine doses administered ($R^2=0.0195$).

When diagnosing leptospirosis, clinicians generally identified clinical signs most often cited in the literature as commonly associated with leptospirosis; jaundice (64.04 per cent), fever (52.8 per cent), and vomiting (41.57 per cent) (Fig 1). Fever and vomiting are both common during the anicteric stage of disease. Of the practices that witnessed lab-confirmed cases, none reported considering vaccination history, whereas three witnessing suspected cases highlighted a lack of vaccination as a risk factor for infection. Overall, fifteen practices reported considering leptospirosis vaccination status when making a diagnosis.

This study investigated the number of suspected and confirmed canine leptospirosis cases within UK vet-visiting dogs. Practices reported cases that they either believed or confirmed to be canine leptospirosis over a 12-month period. Thirteen reported a case within the previous 12 months (14.61 per cent) with no practice reporting more than one case in the 12 previous months. Cases lab confirmed by PCR ($n=3$) did not report a serogroup.

Despite no data available for UK infection rates, a study in Germany identified 18 per cent (58/329) of vet-visiting dogs presenting relevant clinical signs were infected (Mayer-Scholl and others 2013). France is reported to have a higher incidence of human leptospirosis (Jansen and others 2005), and reports indicate a prevalence of 38.6 per cent within dogs presenting non-specific symptoms (Renaud and others 2013). Our study reported infection within 14.61 per cent of practices, although this may underestimate true case numbers if dogs showing mild clinical signs (eg vomiting or diarrhoea) are not presented to vets, or a presumptive leptospirosis diagnosis is not made, furthermore, this study had a relatively low response rate.

Twelve of the thirteen cases reported within the last 12 months had no current vaccination, emphasising the need for regular, annual *Leptospira* canine vaccinations. The majority of reported cases resulted in a high mortality rate ($n=8/13$; 61.54 per cent), which is higher than that previously reported (78 per cent survival rate) (Adin and Cowgill 2000, Goldstein and others 2006). This may relate to diagnostic issues of identifying leptospirosis at an early stage to increase survival likelihood.

We found little evidence for either larger or dedicated small animal practices administering a greater number of vaccine doses, suggesting that practice vaccination habits depend on individual clinicians rather than caseload. As practices witnessing cases reported a reduced number of vaccine doses administered, improving awareness of leptospirosis may aid in greater vaccine coverage to prevent future cases.

Locations of practices reporting cases within the last 12 months were explored for potential hot spots for canine leptospirosis. Six practices were from urban areas, with seven from rural or semirural areas. With the low numbers, no distinct area/environment could be identified as a higher risk for disease.

Only seven practices reported rodent/water contact as a factor for the canine contracting leptospirosis. This figure was lower than expected considering the importance of contaminated urine or water in *Leptospira* transmission. Current vaccination status was only considered during a differential diagnosis in 16.85 per cent of practices, whereas signs, such as lethargy, polydipsia/polyuria and renal failure were more common diagnostic considerations.

The lack of consideration for environmental factors for diagnosis raises an interesting point. As extremes in pH or temperature restrict *Leptospira* survival (Smith and Turner 1961, Parker and Walker 2011), sources of canine infection are typically standing bodies of contaminated water. Damp soil facilitates environmental

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TABLE 1: Case and practice details for the 13 practices reporting a leptospirosis case in the last 12 months

Case Reference	Lab confirmed		Up to date vaccination*		Age (years)	Breed	Outcome	Vaccine doses administered by practice†	Estimated percentage of dogs with an up to date vaccination (%)
	Yes	No	Yes	No					
1004	+			+	N/A‡	Yorkshire terrier cross-breed	Died	1200	30
1007	+			+	5	Australian cattle dog	Recovered	500	70
1009	+		+		2	Springer spaniel	Recovered	3136	55
1014		+		+	5	Cross-breed	Recovered	960	56
1018		+		+	N/A‡	Working labrador	Recovered	3000	50
1027		+		+	4	Border collie	Died	900	65
1029		+		+	5	Springer spaniel	Died	775	60
1129	+			+	3	Old English sheep dog	Recovered	884	80
1315		+		+	8	Staffordshire bull terrier	Died	3600	30
2021		+		+	6	Huntaway	Died	2800	53
2146		+		+	7	Boxer	Died	2474	60
2166	+			+	0.4	Labrador	Died	473	85
2171		+		+	10	Jack Russell	Died	987	70

*Unknown option was offered in the questionnaire; however, it was not selected by any returning practices

†Over the past 12 months

‡N/A=Information not given

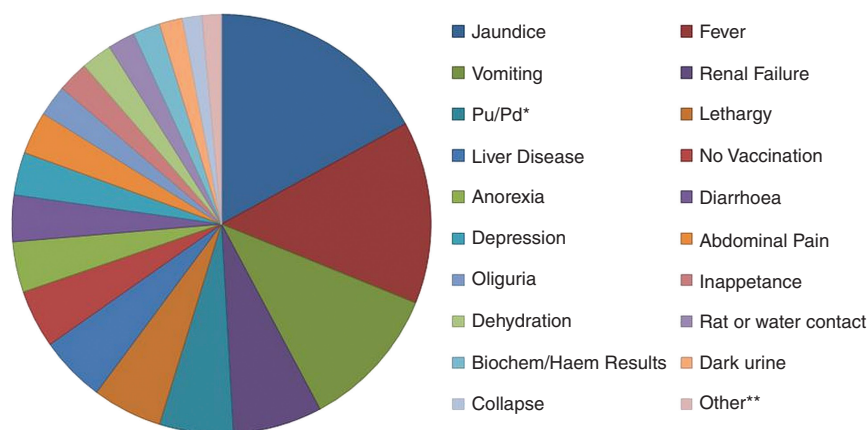


FIG 1: Pie chart representing clinical signs and risk factors considered during diagnosis, as reported by corresponding vets. *Pu/Pd, Polyuria and Polydipsia; **Other, Clinical signs reported in <5 per cent of returning practices including toxæmia, coughing, age, breed and shock

survival and growth (Smith and Self 1955), while rodent contact either directly or indirectly (urine contact) also impacts disease risk. Despite no current data for UK dogs, human cases have been linked to rodent/water contact (Forbes and others 2012). As the same serovars can infect human beings and dogs, these potential risk factors should be considered.

We demonstrate that canine *Leptospira* infections are present in the UK despite vaccine availability, and that dogs are dying as a result of such infections. Increasing awareness of leptospirosis, early clinical signs, and risk factors involved, should improve diagnostic testing uptake. Early identification benefits treatment and increases survival likelihood. As all but one case was witnessed within non-vaccinated canines, it highlights the importance for dogs in the UK to maintain a current vaccination. It is of concern that one currently vaccinated case became infected. Further investigation is required to determine if this was due to a serogroup not covered by the bivalent vaccine. Recently, details of a novel tetravalent vaccine were published (Klaasen and others 2013), protecting dogs against challenges from serogroups Canicola, Icterohaemorrhagiae, Grippotyphosa and Australis. Monitoring serovars passing through practices will benefit vaccination programmes and ultimately keep dogs protected from leptospirosis.

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