Prevalence and Risk Factors for Epilepsy of Unidentified Origin among Dogs in the U.K.

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Background

Primary epilepsy is diagnosed when the cause of the seizures is unknown and has been reported to be commonly diagnosed in dogs [1, 2, 3]. The epidemiological evaluation of primary epilepsy in dogs is an under-researched area within first opinion practice and consequently there is a lack of prevalence data across all breeds. Risk factors which have been previously associated with primary epilepsy in dogs include breed, sex and neuter status [2].

M&M

Data collection: Data were collected from veterinary episodes of care from 92 primary veterinary clinics as part of the VetCompass [4] companion animal surveillance project (2007-2011). The RVC Ethics and Welfare Committee granted ethical approval.

EUO Case definition: Cases were ascertained from dogs with:
- A summary diagnosis, clinical notes or diagnostic tests indicative of a diagnosis of EUO.
- Treatment data indicating long-term antiepileptic treatment (≥4 repeat prescriptions). Treatment data were searched for repeat prescriptions of epilepsy treatment drugs, both generic and brand names.

Analysis: Variables evaluated included clinic ID, sex, neuter status, pure-breed status, most common pure-breed, pure-breed group, pure-breed size, pure-breed coat length, number of colours in coat, coat colour, age group and weight category. Data analysis used STATA 12. Descriptive statistics were generated. Risk factors were analysed using mixed-effects logistic regression accounting for clustering at the veterinary clinic level.

Aims

The aims of this study were to estimate the prevalence and investigate risk factors for epilepsy of unidentified origin (EUO) in order to provide a scientific basis for breeding reforms that improve animal health.
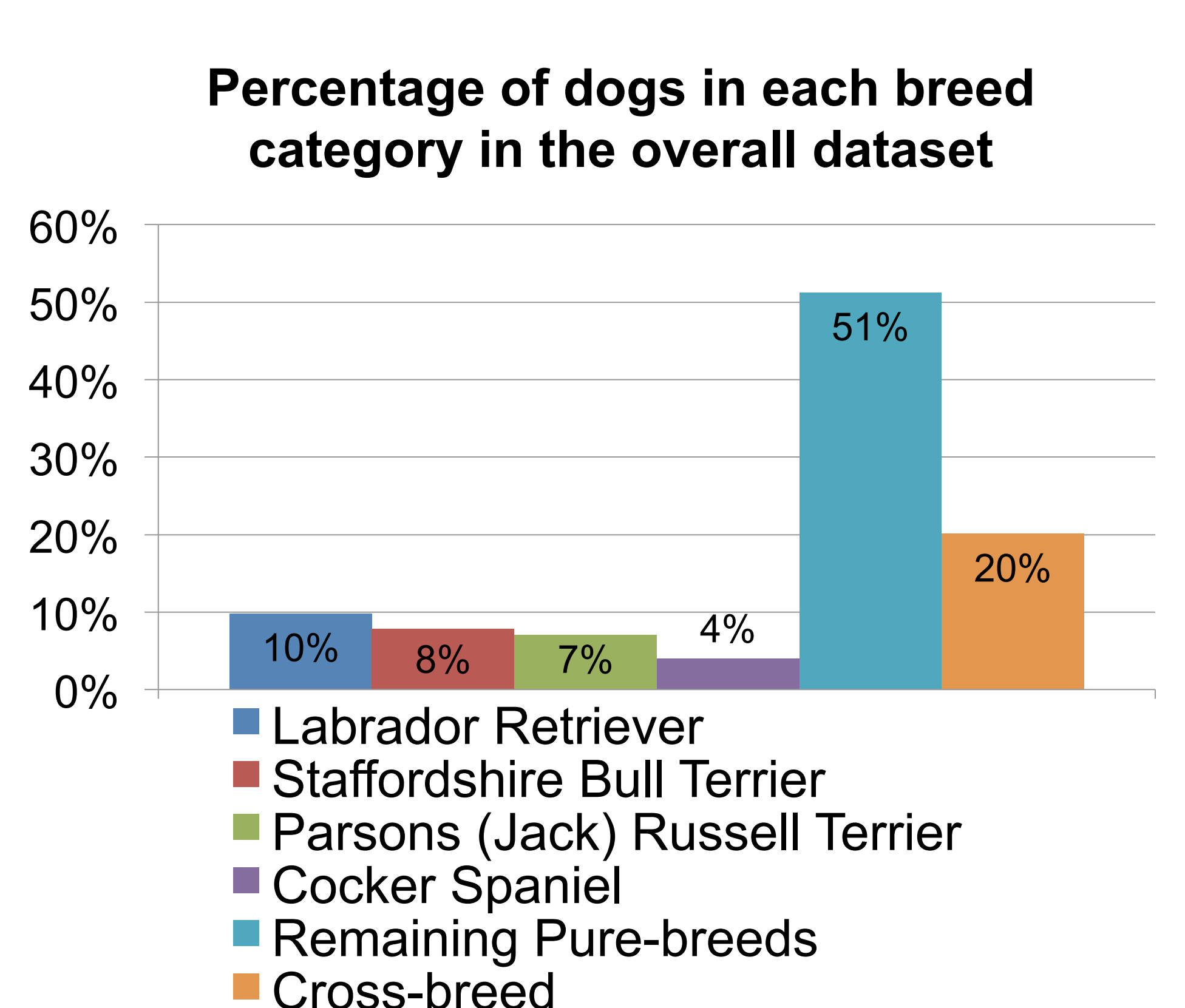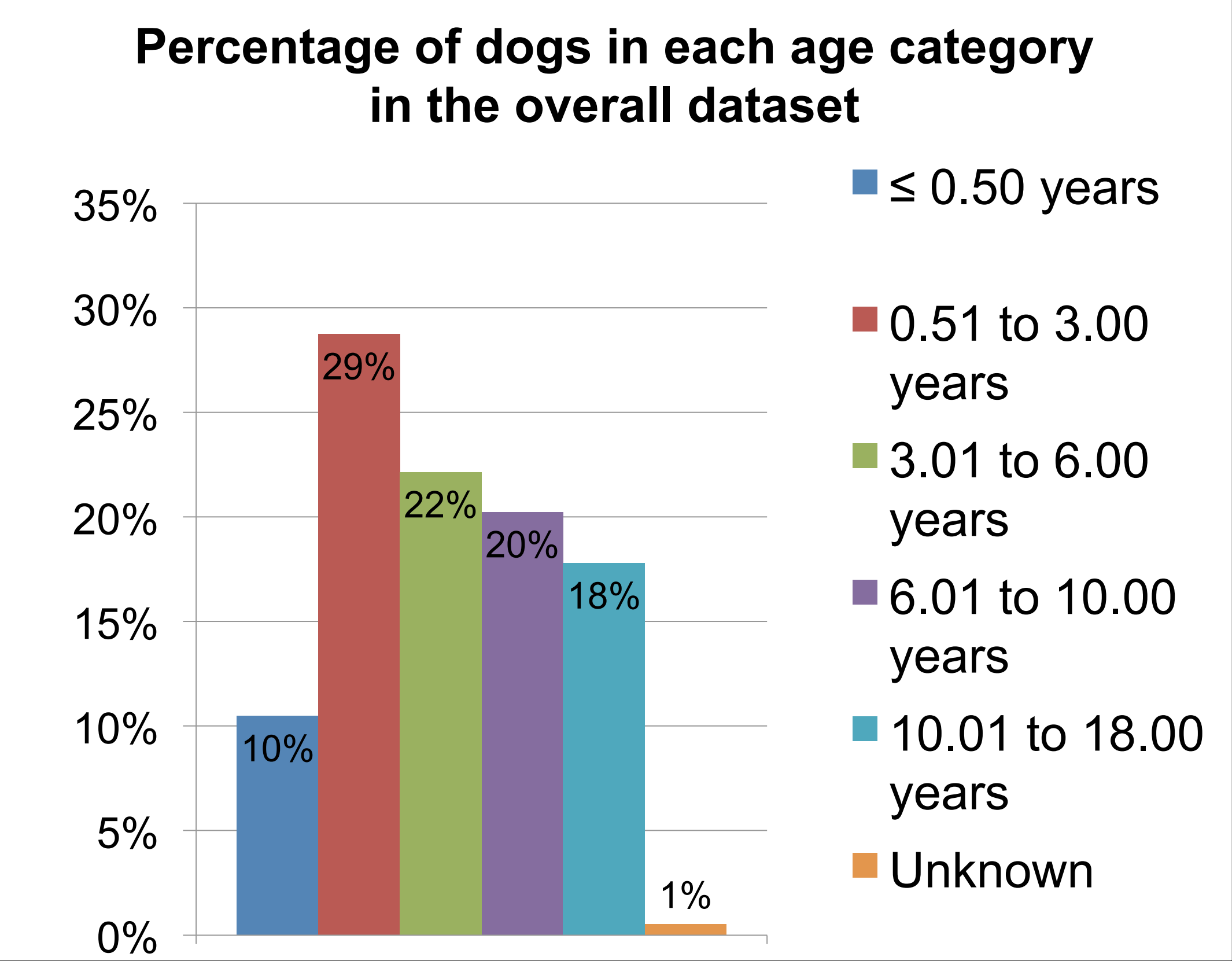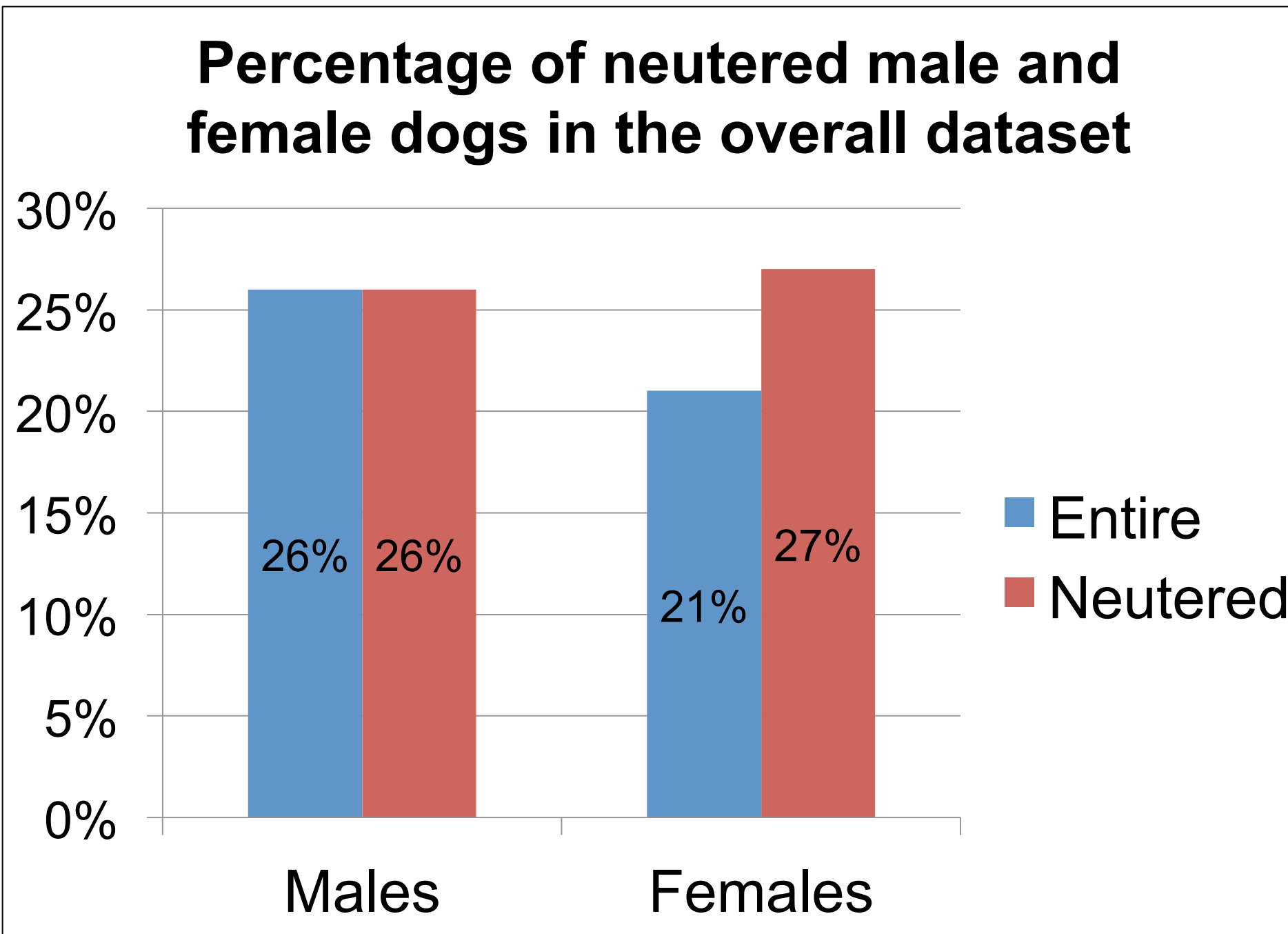
Descriptive

Summary: The 92 veterinary practices contributed data on 87,317 dogs.
- 48% were female
- 53% were neutered
- 20% were cross-breed
- 27% were pure-breed large
- 44% were pure-breed short haired
- 43% were self-coloured

The most common KC breed groups within the cohort were:
- Terriers (22%)
- Gundogs (21%)

Percentage of neutered male and female dogs in the overall dataset

Males: Entire 26%, Neutered 26%
Females: Entire 21%, Neutered 27%

Percentage of dogs in each age category in the overall dataset

- ≤ 0.50 years: 10%
- 0.51 to 3.00 years: 29%
- 3.01 to 6.00 years: 22%
- 6.01 to 10.00 years: 20%
- 10.01 to 18.00 years: 18%
- Unknown: 1%

Percentage of dogs in each breed category in the overall dataset

- Labrador Retriever: 10%
- Staffordshire Bull Terrier: 8%
- Parsons (Jack) Russell Terrier: 7%
- Cocker Spaniel: 4%
- Remaining Pure-breeds: 51%
- Cross-breed: 20%

539 EUO cases were identified, giving an EUO prevalence of 0.62% (95%CI 0.57-0.67%):
- 2% received an MRI scan
- 88% received long-term anti-epileptic drugs.

Treatment Regime for EUO cases	No. Dogs (%)
Phenobarbitone ONLY	377 (79.5%)
Potassium Bromide ONLY	17 (3.6%)
Phenobarbitone AND Potassium Bromide	68 (14.4%)
Phenobarbitone AND Keppra AND Potassium Bromide	4 (0.8%)
Remaining Combinations	8 (1.7%)

Risk Factors

Mixed effects multivariable logistic regression analysis of risk factors for canine epilepsy of unidentified origin		
Variable	**Category** (*** P<0.001 ; ** p<0.01)	**Odds Ratio (95% Confidence Interval)**
Sex	Female	[base]
	Male***	1.72 (1.44-2.06)
Most Popular Breeds	Cross-breed	[base]
	Border Collie	1.39 (0.88-2.20)
	Border Terrier ***	2.70 (1.57-4.62)
	Boxer	1.29 (0.67-2.50)
	Cavalier King Charles Spaniel	0.88 (0.47-1.64)
	German Shepherd Dog**	1.90 (1.28-2.80)
	Parson (Jack) Russell Terrier	1.30 (0.91-1.87)
	Golden Retriever	1.45 (0.88-2.39)
	Labrador Retriever	1.35 (0.98-1.86)
	Cocker Spaniel	1.16 (0.72-1.88)
	Staffordshire Bull Terrier	0.84 (0.53-1.31)
	Yorkshire Terrier	0.71 (0.39-1.31)
	English Springer Spaniel	0.59 (0.27-1.28)
	West Highland White Terrier**	0.23 (0.08-0.62)
	Remaining Pure-breed	1.16 (0.89-1.51)
Age	≤ 0.50 years**	0.07 (0.01-0.49)
	0.50 to 3.00 years	[base]
	3.01 to 6.00 years***	3.49 (2.67-5.39)
	6.01 to 10.00 years***	6.81 (4.88-9.51)
	10.01 to 18.00 years***	6.58 (4.68-9.25)

- Male dogs had 1.72 times the odds of EUO compared with females (OR 1.72; 95% CI 1.44-2.06; p<0.001).
- Border Terriers had 2.70 times the odds of EUO compared with cross-breed dogs (OR 2.70; 95% CI 1.57-4.62; p<0.001).
- German Shepherd Dogs had 1.90 times the odds of EUO compared with cross-breed dogs (OR 1.90; 95% CI 1.28-2.80; p=0.001).
- West Highland White Terriers had 0.23 times the odds of EUO compared with cross-breed dogs (OR 0.23; 95% CI 0.08-0.62; p=0.004).

Final multivariable mixed effects regression modelling included sex, breed and age. There was strong evidence of data clustering with veterinary clinical when assessed against basic logistic regression (p=0.0017) so veterinary clinics was retained as a random effects in the model. Hosmer lemeshow test statistic indicated good model fit for the non-random effect model (p=0.8552). Variables with no evidence shown for an association with EUO included neuter status, pure-breed verses cross-breed, and coat colour.

Conclusions

In this study, the prevalence of EUO was found to be 0.62%. Risk factors associated with EUO included sex and breed, with strong evidence that male dogs had an increased odds of EUO compared with female dogs. Whilst certain breeds appear to influence the odds of EUO, Border Terrier, German Shepherd Dog and West Highland White Terrier, it is important to note that when overall pure-breeds were compared against cross-breed dogs, there was little evidence of an association. Repeat analysis of the expanding VetCompass dataset following further data capture would increase power to determine breed effects.

References
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