Associations between neutering and early-onset urinary incontinence in bitches under primary veterinary care in the UK: A VetCompass™ cohort study

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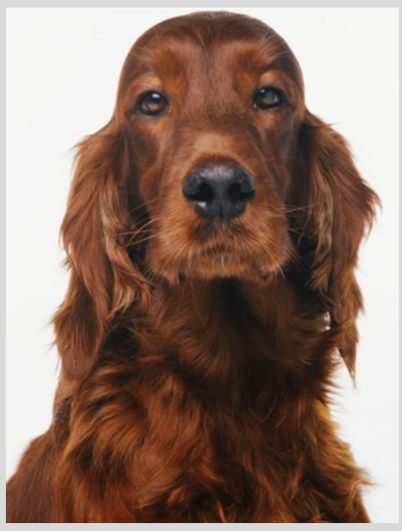
Introduction

Project Background

- Urinary incontinence (UI) is the involuntary escape of urine during the storage phase of micturition[1].
- UI affects approximately 3% of bitches under primary veterinary care in England[2].
- Larger breeds are predisposed, in particular the Irish Setter and Dobermann[2].



Neutering as a risk factor[3]* *Existing evidence is weak[4] → UI → Increased risk of urine scald and infection[5]

Aim: To characterise the epidemiology of early-onset UI in bitches attending UK practices in a cohort study.

Objectives:

1. To evaluate the association between neuter status and early-onset UI
2. To evaluate the association between age at neuter and early-onset UI
3. To estimate the frequency of early-onset UI in bitches

The above objectives will be addressed, whilst accounting for other risk factors including age, breed and bodyweight.

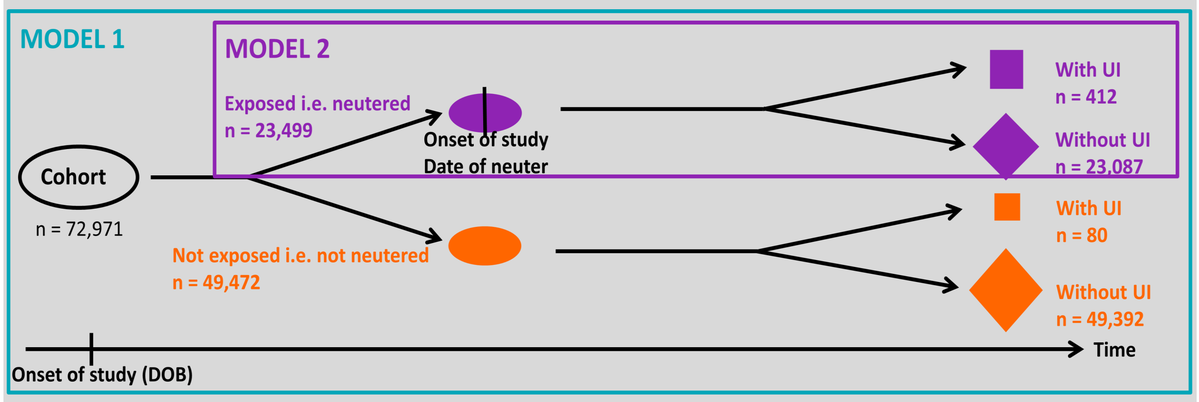
Methods

- A retrospective cohort study followed all bitches born from January 1st 2010 to December 31st 2012 until 31st March 2018. All early-onset UI cases were identified.
- Included as a UI case if:

a) final diagnosis of UI recorded in the Electronic Patient Record (EPR) and/or
b) treatment with either phenylpropanolamine or oestriol.

- Early-onset UI was defined as urinary incontinence first diagnosed ≤ 8 years.
- Two Cox regression models separately evaluated hazard of UI and association with neutering from :

1. The date of birth for all bitches both neutered and entire and
2. The date of neutering for the neutered subset of bitches.

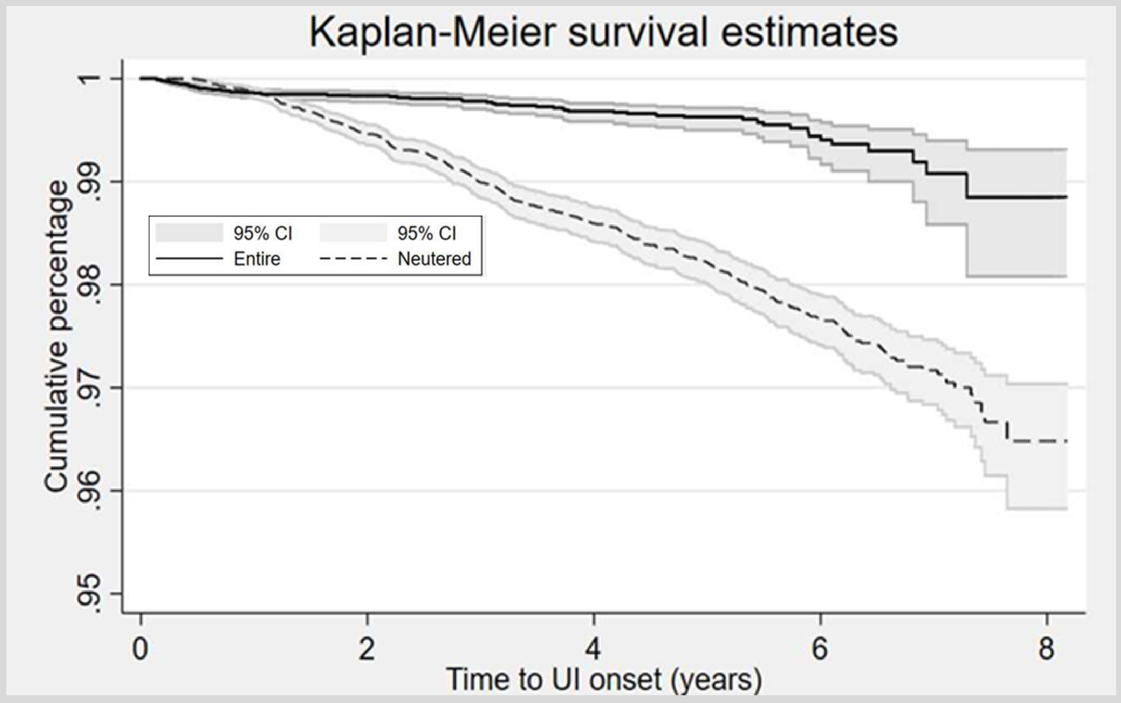


- Other variables considered included breed, bodyweight and veterinary practice group.

Results

- 492 bitches (from 72,971) identified with early-onset UI
- Incidence risk 0.68% overall. Entire bitches 0.16% vs neutered bitches 1.75%.

Model 1 – neuter status and early-onset UI



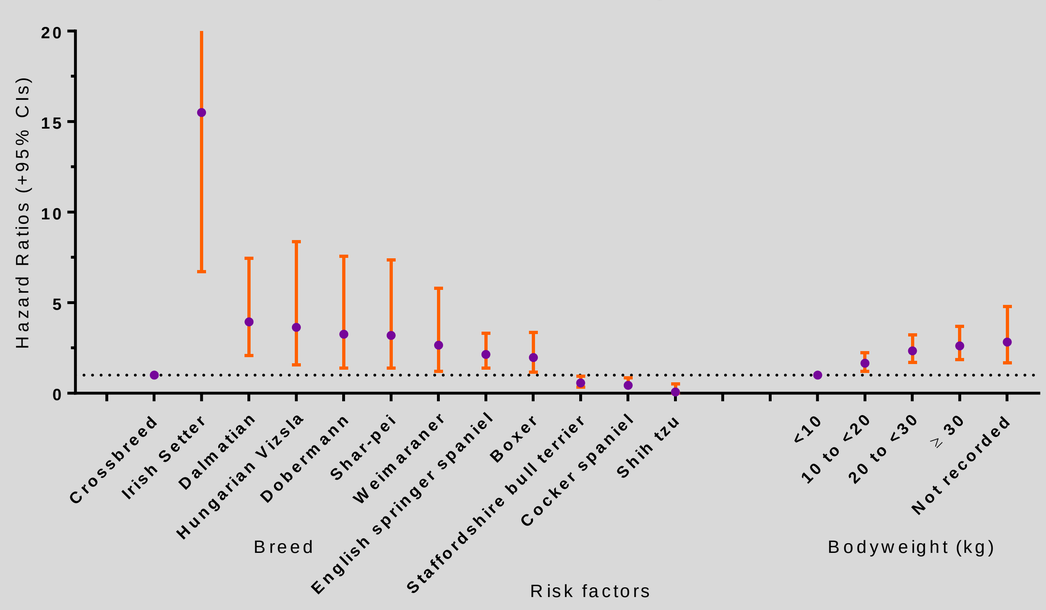
- **Increased hazard of early-onset UI identified in neutered bitches**

Table 1: Multivariable Cox regression results for "neuter status" as a risk factor for UI diagnosis

Variable	Category	Hazard Ratio	95% CI*	Category P-value
Neuter status	Entire	Base		
	Neutered	**2.12**	**1.36 to 3.29**	**0.001**
Time-dependent effect - Neuter status	Entire*Time interaction	Base		
	Neutered*Time interaction	**1.23**	**1.05 to 1.43**	**0.010**

Hazard year 1 (from birth) = 2.12, hazard year 2 = 2.12 x 1.23 = 2.61 etc.

Demographic risk factors for early-onset UI diagnosis from final multivariable Cox regression model



Model 2 – age at neuter and early-onset UI

- **Increased hazard of early-onset UI in bitches neutered prior to 6 months within the first two years following neuter**

Table 2: Multivariable Cox regression results for "age at neuter" as a risk factor for UI diagnosis

Variable	Category	Hazard ratio	95% CI*	Category P-value
Age at neuter (months)	**< 6**	**1.82**	**1.15 to 2.88**	**0.011**
	6 - < 12	Base		
	12 - < 24	0.88	0.58 to 1.34	0.548
	≥ 24	0.78	0.44 to 1.40	0.406
Time-dependent effect - Age at neuter (months)	**< 6*Time interaction**	**0.75**	**0.63 to 0.90**	**0.002**
	6 - < 12*Time interaction	Base		
	12 - < 24*Time interaction	1.10	0.95 to 1.28	0.188
	≥ 24*Time interaction	1.23	0.94 to 1.60	0.129

Hazard year 1 (from neuter) in bitches neutered < 6 months = 1.82,
Hazard year 2 = 1.82 x 0.75 = 1.37, hazard year 3 = 1.82 x 0.75 x 0.75 = 1.02 etc

- Increasing bodyweight and similar breeds (to model 1) also identified as significant risk factors for UI diagnosis

Conclusions

- Neutering per se and early-age neuter (< 6 months) identified as major risk factors associated with increased hazard of early-onset UI.
- Results suggest early-age neuter should be carefully considered - particularly in high-risk/heavier breeds.
- Decision to neuter is multifactorial so need to consider other issues also.

References

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3. Holt P & Thrusfield M (1993) Veterinary Record 133, 177-180
4. Beauvais W et al. (2012) JSAP 63, 198/204
5. Diesel G et al. (2010) Veterinary Record 166, 455-458

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