Development of a novel diagnostic prediction tool for Cushing's syndrome in dogs, using primary-care electronic patient records

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OBJECTIVES

To predict a diagnosis of Cushing's syndrome (CS) from demographic, clinical signs and routine laboratory data collected using electronic patient records.

METHODS

A nested case-control study design used records from a VetCompassTM sample population of 905,544 dogs.

Cases had laboratory-confirmed CS diagnoses. Controls were initially suspected of CS but consequently ruled out by diagnostic laboratory tests. Multivariable logistic regression was used to identify CS predictors. Internal validation was performed using bootstrapping resampling with shrinkage applied to predictors to adjust for overfitting. The coefficients from the final model were used to develop a predictive scoring tool. Model calibration, discrimination and fit were assessed.

RESULTS

The study included 547 incident CS cases and 541 controls. Sex, polydipsia, polyphagia, hepatomegaly, alopecia, thin skin, ALKP, ALT and urine specific gravity were found to be predictive of a diagnosis of CS. Vomiting and pruritus reduced the likelihood of diagnosis. The developed model demonstrated good discrimination AUROC = 0.82 (95% CI 0.79 – 0.84) and calibration (C-slope = 0.96). Brier score was 0.17 and Cragg-Uhler's R^2 was 0.41 suggesting good model fit. A scoring system of –16 to 10 was developed from the model, with corresponding predictions of a dog having CS calculated for each possible score. An individual dog scoring 10 reflects a 97% likelihood of CS and –16 reflects a 1% likelihood.

STATEMENT (CONCLUSIONS)

This novel tool can predict the likelihood of a dog having CS using data collected in primary-care veterinary practice, to aid clinical decision-making and increase confidence in diagnosis.