



Aging Well: Methodology



Analysis summary

In this study, Nationwide's® Pet Health Analytics and Insights Team (PHAIT) analyzed the policy and claims data from 3,464,566 dog years at risk¹ (DYAR) and 626,137 cat years at risk (CYAR). These data represented Nationwide-insured dogs and cats over a six-year period (2016-2021). Using the 2019 American Animal Hospital Association (AAHA) Canine Life Stage Guidelines² and the 2021 AAHA/American Association of Feline Practitioners (AAFP) Feline Life Stage Guidelines,³ species- and breed-specific life stage classifications were applied to these data. Per AAHA, this simplified grouping of puppy/kitten, young adult, mature adult, and senior "is consistent with how pet owners generally perceive their dog's maturation and aging process and provides a readily understood basis for an evolving, lifelong healthcare strategy."

Combining this volume of high-quality insured pet data with a life stage classification framework allowed Nationwide to make accurate assessments of disease risk across our canine and feline populations and deliver insights that are meaningful and approachable for pet families and veterinary healthcare teams.

Methodology

Data sources

Breed and condition data were directly sourced from Nationwide policy and claims data.

For the disease categories used in the study, Nationwide's proprietary individual condition codes were mapped to the senior disease classifications described in the publication. For example, data for diabetes was derived from claims with conditions codes that include "diabetes mellitus" and "ketoacidosis".

Data for AAHA Life Stage Guidelines was used with permission from the American Animal Hospital Association. For canines, AAHA includes data for 163 "breeds", including some popular crossbreds (e.g., 'Goldendoodle') and mixed breeds by size (e.g., Mix Breed-Large). When mapped 1:1 with Nationwide's breed list, 98% of policies were matched directly. For the remaining Nationwide breeds, an AAHA match was assigned based on high-level breed similarity. For example, the Spanish Water Dog (not in AAHA's list) was assigned life stages that represented the Portuguese Water Dog, similarly the Maremma Sheepdog was assigned life stages for the Great Pyrenees.

¹ "Years at risk" are the number of years for which Nationwide has provided insurance coverage – a pet insured for five years provides data for five years at risk.

² <https://www.aaha.org/aaha-guidelines/life-stage-canine-2019/life-stage-canine-2019/>

³ <https://www.aaha.org/aaha-guidelines/life-stage-feline-2021/feline-life-stage-home/>

Analysis

Relative risk was used to compare the incidence rate of a group or breed to the incidence rate of the population with the group or breed excluded. Relative risk for a breed or group was calculated by dividing the incidence rate of the breed or group by the incidence rate of the rest of the population (breed excluded).

When examining an individual breed or group's relative risk for a condition, only those with statistically significant representation were included. Confidence intervals (CI) were calculated with the R-package "exactci" (version 1.4-0).⁴ Two-sided one sample z tests of proportions were used to compare proportions. The Bonferroni correction was used to adjust for multiple comparisons (1,272 comparisons: 318 breeds with four life stages for each) with p-values < 0.000007862 after corrections indicating statistical significance.⁵

Calculation of relative risk

Unless otherwise specified, relative risk is in relation to "all other dogs" in the study population. By way of example, if a given breed (breed X) has 300 claims for diabetes out of a sample size of 10,000 DYAR, the analysis focuses on the comparison between that rate, and the rate of diabetes in all dogs who are not members of breed C. Incidence and relative risk for breed X vs. "all other dogs" is calculated as in the example below:

Total number of breed X with at least one claim for diabetes = 300

Total number of DYAR for breed X = 10,000

Total number of dogs with at least one claim for diabetes = 1,500

Total DYAR = 100,000

Incidence within breed X:

$$\frac{\text{Number of dogs in breed X with diabetes}}{\text{Number of DYAR for breed X}} = \frac{300}{10,000} = 3.00\%$$

Incidence in "all other dogs":

$$\frac{(\text{Number of dogs with diabetes in total population} - \text{Number of dogs in breed X with diabetes})}{(\text{DYAR of dogs in total population} - \text{DYAR of dogs in breed X})} = \frac{(1,500 - 300)}{(100,000 - 10,000)} = \frac{1,200}{90,000} = 1.33\%$$

Diabetes relative risk, or risk ratio, in breed X compared to "all other dogs":

$$\frac{\text{Incidence within breed X}}{\text{Incidence in all other dogs}} = \frac{3.00\%}{1.33\%} = 2.26 \text{ (226\%)}$$

Note: when calculating relative risk for breed X within a life stage, "all other dogs" includes 1) other dog breeds within that life stage and 2) dogs in all other life stages, including breed X.

⁴ Fay, M. P. Two-sided exact tests and matching confidence intervals for discrete data. R Journal. 2, 53–58 (2010).

⁵ Etymologia: Bonferroni correction. Emerg Infect Dis. 2015 Feb;21(2):289. doi: 10.3201/eid2102.et2102. PMID: 25786274; PMCID: PMC4313667.

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These white papers analyze senior diseases in dogs and cats and are a continuation of a larger series of studies on companion animal health and veterinary industry trends. While most will be conducted by Nationwide's Pet Health Analytics and Insights Team, others will be created with input from academic partners. As the leading U.S. pet health insurer with more than 1 million pets actively protected, Nationwide believes these studies to be of use to veterinary professionals and pet families alike while helping to advance the use of industry data sources in developing guidance on pet selection and care to the benefit of all.

We believe this model of relative risk analysis will act as a foundation for Nationwide to provide evidence-based, clinically actionable tools to veterinary healthcare teams and pet families. Personalizing pet health education will drive more effective preventive care, prolong healthy lifespan, and improve pet health outcomes.

Authors: Jules Benson, BVSc MRCVS, Chief Veterinary Officer; Stacey Neff, MS, Biostatistician; Sarah Peterson, BS, Data Analyst; Emily M. Tincher, DVM, Director of Veterinary Relations; Gina Spadafori, BA, Veterinary Communications.

To reach Nationwide's Pet Health Analytics and Insights Team with questions, comments or media requests, contact Nationwide's Corporate Communications team: news@nationwide.com.

