



Nationwide[®]

Brachycephalic Breed Disease Prevalence Study

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The Nationwide® Brachycephalic Breed Disease Prevalence Study

Short-nosed breeds more often affected by common conditions, not just known issues

A biostatistical analysis of the pet health insurance claims of more than 1.27 million dogs over a nine-year span shows that even after removing conditions linked specifically to brachycephalic breeds, dogs with the structure common to these animals are less healthy than dogs with a more normal canine appearance.

Recent years have seen a surge in the popularity of the short-nosed breeds of dogs collectively known in the veterinary community as “brachycephalic.” The increase is not surprising: long known for their charming temperaments, many of these breeds are part of the wave of small dogs who seem a perfect fit with busy, modern life.

The American Kennel Club lists three brachycephalic breeds (bulldogs, French bulldogs and boxers) in its top 10 most popular breeds; seven in the organization’s top 25. The AKC reports the French bulldog is the most popular breed in New York City, with bulldogs and Cavalier King Charles spaniels at No. 1 in select Manhattan ZIP codes. Nationwide’s proprietary claims data bears out the popularity of these breeds. Of the 1.27 million dogs whose health insurance claims were analyzed for this study **[Figure 1]**, 15% were members of one of the 24 breeds identified as brachycephalic. (Nationwide’s list of all breeds includes more than 300 purebreds and crossbreds, not including five classifications of mixed breeds by size.)

Pugs, bulldogs and French bulldogs have especially become advertising mainstays. Celebrities from Lady Gaga to Dwayne “The Rock” Johnson are proud owners, and the French bulldogs of heiress Patricia Hearst recently took top prizes at the Westminster Kennel Club Dog Show. Some of these dogs are celebrities themselves, building audiences in the tens of thousands on social media and picking up managers and modeling contracts along the way.

Veterinarians have long known these breeds come with their own set of health challenges. The first

By the numbers

The study includes the Nationwide pet health insurance claims of more than 1.27 million dogs.

Period of study: 2007-2015, inclusive

Brachycephalic breeds: 24

Brachycephalic breed dogs: 184,748

Non-brachycephalic dogs: 1,087,157



[Figure 1]

time a brachycephalic puppy or dog comes in to a veterinary practice, owners are often counseled about the risk of heat stroke. For some owners, a general practitioner may suggest a referral to specialists with experience in surgically opening nostrils and shortening soft palates. Journal articles on such procedures are no longer focused just on whether or not these procedures are necessary; now there are also discussions on how early to intervene and which surgical techniques are best. The health concerns may be more than anatomical: Recently a widely cited study of the bulldog’s lack of genetic diversity added another round of concern over the prospects for greater health in these iconic dogs.

As Nationwide continues to expand the use of its claims database for the good of pets, pet owners and the veterinary community, the research team in its pet insurance unit chose a different path for studying the health of the brachycephalic breeds. They decided to conduct an analysis that would focus on conditions common to all dogs and then compare brachycephalic breeds to this baseline. The aim was to find out if brachycephalic dogs were less healthy than other dogs beyond the already well established health risks linked to their airway anatomy.

The analysis revealed that brachycephalic breeds are in fact more likely to be affected by disease, even more so than previous studies have shown. These breeds have a higher prevalence of illness for many of the common conditions that affect all dogs.

Brachycephalic breeds are more likely to have common conditions than other dogs at rates ranging from single digits for gastrointestinal issues to triple digits for some ophthalmological issues [Figure 2]. The higher levels were seen across a variety of conditions chosen from a list of common claims not related to airway anatomy.

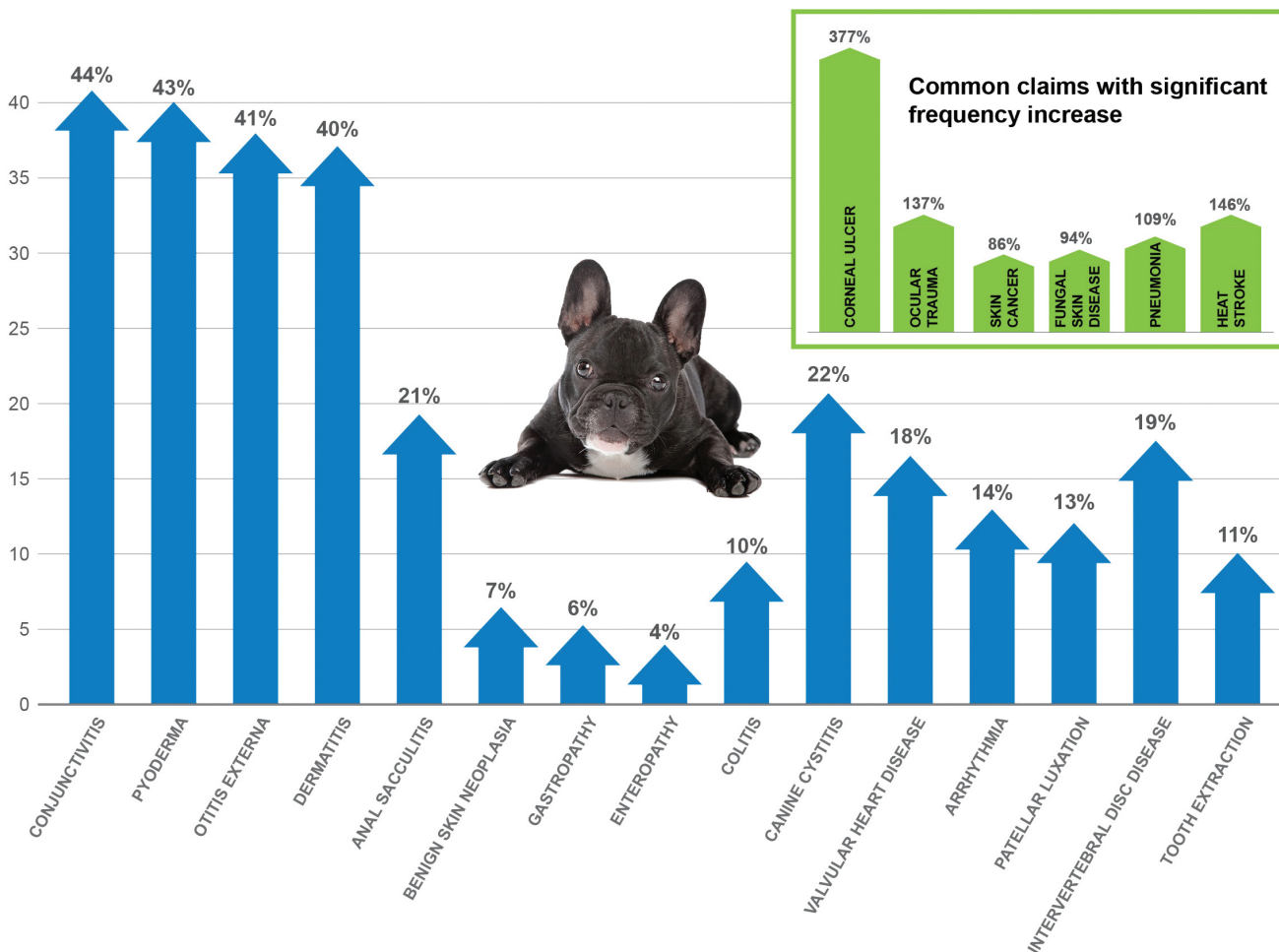
Bringing big data to bear on health concerns

In 2013, Nationwide pet health insurance, then operating under the name of Veterinary Pet Insurance® or VPI®, decided to use its peerless database of pet health insurance claims to develop both medical and financial studies. The goal was to produce analyses that would assist pet owners and members of the veterinary community in making sound decisions around pet health and the business of veterinary medicine.

Common claims and brachycephalic breeds

[Figure 2]

Nationwide® analyzed millions of pet health insurance claims over a nine-year period looking for the prevalence of common disease in brachycephalic breeds vs. their non-brachycephalic counterparts. The percentages below reflect how much more likely a dog from a brachycephalic breed is to have a claim submitted for a given condition.



Nationwide first partnered with economists at the Krannert School of Management at Purdue University to develop a veterinary price index. Refreshed twice a year after its inaugural report in January of 2015, the **Nationwide® | Purdue Veterinary Price Index** has become an industry benchmark. The Index captured not only falling pricing in veterinary medicine during the recent recession, but also the point when the industry hit bottom and started to recover.

With the Price Index in a sustainable semiannual rhythm, Nationwide’s pet insurance unit turned its attention to studies of medical data, using consulting biostatisticians and medical economists to evaluate claims data. The first was **Nationwide’s Osteosarcoma: Prevalence and Influences** study (July 2016), which revealed not only which breeds were at highest risk, but also the influence of region and population density, among other factors, on the disease.

The research team at Nationwide considered articles in peer-reviewed journals and mainstream media as well as calls from some veterinary and advocacy groups to work toward making brachycephalic breeds healthier. Many issues with these breeds are well known and well documented [Figure 3], so Nationwide wanted to look at what hasn’t been analyzed—conditions common to all dogs—using the immense scale of the company’s database. The list of common conditions was set after the removal of claims related to brachycephaly (for example,

Known brachycephalic issues not included

Because the analyses considered the conditions common to all dogs in the Nationwide database, issues well established in veterinary literature as being almost exclusively brachycephalic were not included. The list includes conditions typically known for being under the umbrella of Brachycephalic Obstructive Airway Syndrome (BOAS).

- Stenotic nares
- Elongated soft palate
- Tracheal hypoplasia (stenosis)
- Everted laryngeal saccules



[Figure 3]

Brachycephalic Obstructive Airway Syndrome, entropion or keratoconjunctivitis sicca), and further refined to remove conditions unrelated to anatomy, such as those for accidents (for example, poisonings or trauma) or infectious disease (for example, Bordetella or canine influenza).

Using a database of 1.27 million dogs (184,748 in the 24 breeds [Figure 4] identified as “brachycephalic”), the question became: if you take out conditions known to be related to brachycephaly, are these breeds less healthy, as healthy, or more healthy than dogs of a more moderate canine conformation?

The answer: Less healthy, across a range of common conditions.

Which breeds are included

The following breeds were included as brachycephalic. The non-brachycephalic cohort is all dogs minus all dogs of the brachycephalic breeds.

- Affenpinscher
- Boston terrier
- Boxer
- Brussels griffon
- Bulldog
- Bulldog - olde English
- Bulldog - Victorian
- Cavalier King Charles spaniel
- Dogue de Bordeaux
- French bulldog
- Japanese chin
- Lhasa apso
- Mastiff
- Mastiff - Brazilian - Fila Brasileiro
- Mastiff - bull
- Mastiff - English
- Mastiff - Neapolitan
- Mastiff - Pyrenean
- Mastiff - Tibetan
- Mastiff - Spanish
- Olde English bulldogge
- Pekinese
- Pug
- Shih tzu



[Figure 4]

System by system

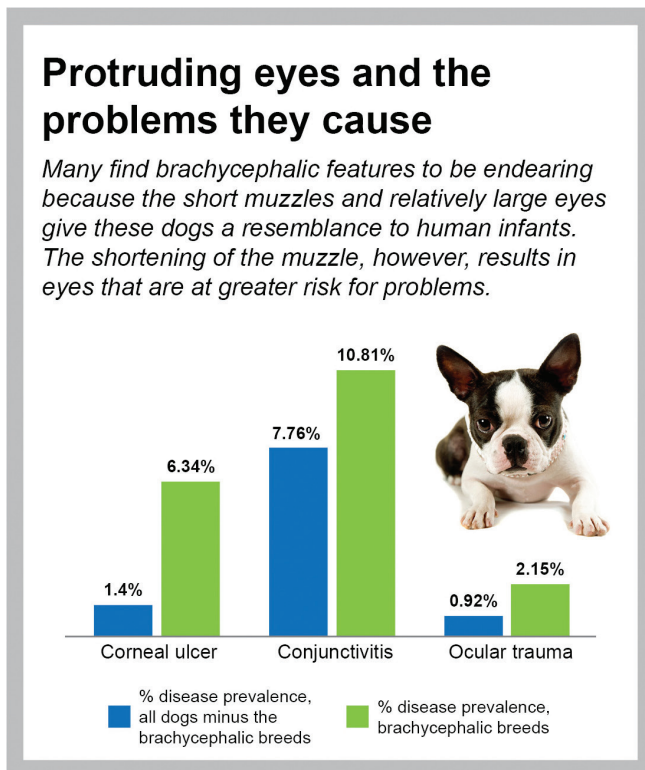
To make the scope of the analysis easier to follow, studied conditions were grouped into organ systems, with the exception of the couple of “stragglers” placed with somewhat similar groups of diseases. The charts compare each condition for all dogs, minus those breeds listed in our brachycephalic group, vs. dogs of the 24 breeds in the brachycephalic group.

Skull structure puts eyes at risk

The structure of the skull is the most recognizable feature of brachycephalic dogs; in fact, it's their unifying trait. ("Brachycephaly" is derived from the Greek roots meaning "short" and "head.")

While much of the attention has been focused on the breathing problems of these dogs, the skull structure forces their eyes into a position that increases risk. Almost every veterinarian in clinical practice has seen multiple cases of eye disease due to the eye position in these breeds.

Corneal ulcers are so frequently diagnosed in brachycephalic dogs that the condition could have been removed from analysis. But since these injuries happen to all dogs quite commonly, corneal ulcers were kept in the study. Brachycephalic dogs are three to four times more likely [Figure 5] than non-brachycephalic dogs to injure their corneas, the highest difference in any of the conditions studied.



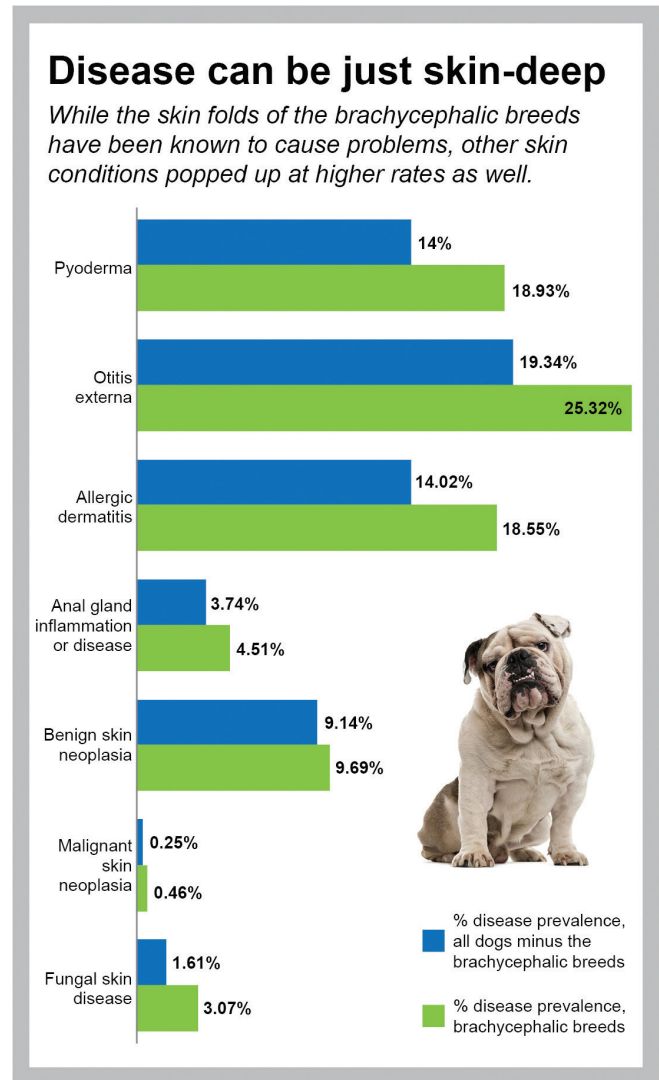
[Figure 5]

Folds welcome fungus

The shortened skull and stubby body of some brachycephalic breeds produces skin folds, as excess skin has nowhere to go. In some brachycephalic breeds, excess skin is prized,

and the dogs who display deeper folds are chosen to reproduce. Fungal skin disease is found at a higher rate in brachycephalic dogs, but so are other dermatological conditions.

From hot spots to ear infections to chronic allergies and even skin cancer, brachycephalic dogs experience higher rates of dermatological disease than other dogs [Figure 6].

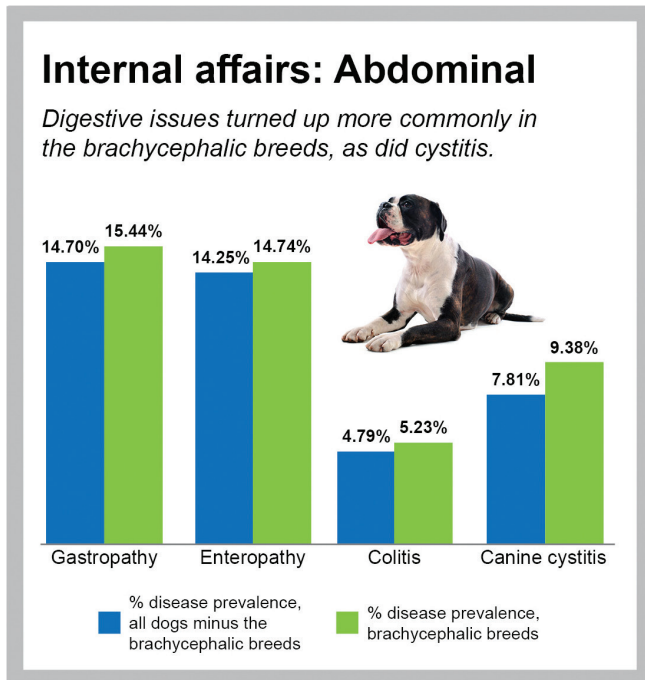


[Figure 6]

Attack of the unhappy belly

It has long been an observation among owners of brachycephalic dogs that the animals are more flatulent than other dogs. Considering the higher prevalence of gastrointestinal tract issues in these breeds, such anecdotes are perhaps not surprising. Their poorly aligned dentition and air-gulping eating style pose a challenge to normal digestive function in these breeds.

The Nationwide analysis turned up higher rates of disease throughout the gastrointestinal system. Grouped in with these digestive issues is another abdominal one: cystitis, or urinary tract infection [Figure 7].



[Figure 7]

The heart (and lungs) of the matter

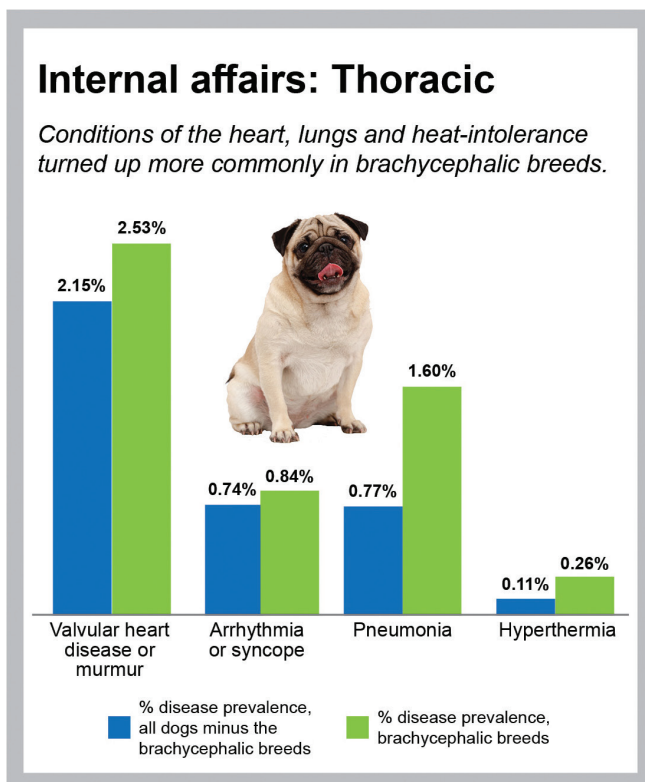
Many veterinarians will counsel a client with a brachycephalic dog to keep the animal out of the heat, and it's likely most owners take the advice to heart.

Even so, brachycephalic breed dogs are almost twice as likely to have a claim for hyperthermia than non-brachycephalic dogs. Heart disease is also more common, and the relative disease rates for pneumonia are particularly noteworthy [Figure 8].

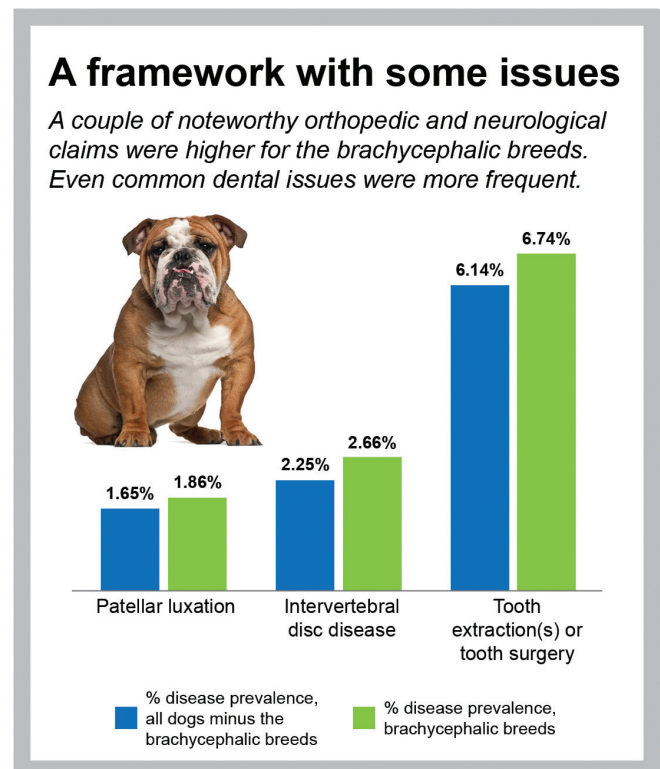
Orthopedic, spinal and dental problems abound

The bulldog's signature "look" derives from an undershot jaw that conveys a "chin-out" determination, which is why this breed is so popular as a mascot for sports teams or even nations. But the dental misalignment is an issue that can make normal eating a challenge. As a result, some pet food companies are marketing kibble in shapes that are easier for these breeds to pick up. Not unexpected: Dental problems and tooth extractions are more common in brachycephalic breeds than in other dogs.

Other issues that turned up more frequently in brachycephalic breeds include patellar luxation and intervertebral disc disease [Figure 9].



[Figure 8]



[Figure 9]

Summary

In launching a series of analyses based on its pet health insurance claims, Nationwide has set a goal of publishing hard data. As the nation's first and largest pet health insurance company with more than 600,000 insured pets, Nationwide believes there's an obligation to provide such data to grow the common body of knowledge and advance discussions that can lead to better health for all pets.

By examining the issues of brachycephalic dogs from a different angle—analyzing common conditions, not brachycephalic-specific ones—Nationwide has expanded the field of inquiry and set a foundation for further study. In so doing, the company is assisting veterinarians, pet owners, breed associations and other stakeholders in the common goal of working together to improve the health of these popular dogs.

With an analysis that shows brachycephalic breeds significantly more impacted than their structurally normal counterparts across a range

of common conditions, Nationwide has opened a new topic for discussion. In so doing, we hope to help improve the quality of life for these dogs, and to lessen the expense their owners have in caring for them.

This analysis is the second medical study drawn from Nationwide's claims database, following its initial work on osteosarcoma. Nationwide has a series of medical studies in the pipeline for future release along with the continued semi annual refreshes of the benchmark **Nationwide® | Purdue Veterinary Price Index**.

Copies of these studies are available for free from the "Studies and Research" tab at NationwideDVM.com.

With each study, we endeavor to use our resources to honor and further the human-animal bond, as we already do every day in providing financial solutions for pet owners and veterinarians through the products we offer at Nationwide.

Glossary

Anal gland expression or sacculitis: Anal gland inflammation or disease.

Arrhythmia or syncope: Irregular heartbeat or fainting.

Atopic or other allergic dermatitis: Chronic allergic skin.

Brachycephalic: When the shape of a skull is shorter than typical for its species.

Brachycephalic Obstructive Airway Syndrome (BOAS): An umbrella term for a collection of anatomical abnormalities in brachycephalic dogs. These abnormalities vary in severity from dog to dog. The treatment is typically surgery.

Canine cystitis: Urinary Tract Infection.

Colitis: Inflammation of the colon.

Conjunctivitis: Inflammation of the membrane lining around the eye.

Corneal ulcer: Condition caused by irritation, trauma, or lack of protection to front of eye.

Elongated soft palate: A condition where the soft palate of the roof is too long, causing the tip of it to protrude into the airway and interfere with movement of air into the lungs.

Enteropathy: Intestinal upset and/or diarrhea.

Entropion: Having eyelids that are inverted or folded inward, with the result of having the eyelashes and hair irritating the cornea.

Everted Laryngeal Saccules: A condition in which tissue within the airway, located just in front of the vocal cords, is pulled inward and partially obstructs airflow.

Fungal skin disease: Excessive fungal growth, frequently related to skin folds.

Gastropathy: Stomach upset and/or vomiting.

Hyperthermia: Heat stroke.

Intervertebral disc disease: Spinal disc deterioration or prolapse.

Keratoconjunctivitis sicca (KCS): Also known as "dry eye syndrome," in which the body is unable to produce adequate amounts of tears.

Malignant skin neoplasia: Skin cancer.

Ocular trauma: Eye injury.

Otitis externa: Most common type of ear infection.

Patellar luxation: Slipping kneecap.

Pyoderma and/or hot spot: Skin irritation or infection.

Stenotic nares: Pinched or narrow nostrils.

Tracheal hypoplasia: A malformation of the tracheal (windpipe) cartilage rings, causing a narrowing of the airway.

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