



# Online survey to determine client perceptions of feline chronic lower airway disease management: response to therapy, side effects and challenges encountered

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## Abstract

**Objectives** The first aim of this survey was to report client experiences associated with the administration of common medications, particularly glucocorticoids and bronchodilators, in managing cats with feline lower airway disease (FLAD). The second aim was to ascertain client perception of response to treatment and level of satisfaction.

**Methods** This was a prospective cross-sectional study. An online survey was distributed worldwide to cat owners caring for cats with a chronic cough. Only cats reported to have FLAD were included.

**Results** A total of 153 complete responses describing cats with FLAD were analyzed. Glucocorticoids and bronchodilators were the predominantly prescribed therapeutics for 140/153 (92%) and 80/153 (52%) of FLAD cats, respectively. Oral and inhalant administration routes were reported most commonly: glucocorticoids (64% oral and 75% inhalant) and bronchodilators (21% oral and 88% inhalant). A review of how air quality could be improved was conducted for 54% of cats. Almost half (43%) of owners reported adverse effects secondary to glucocorticoid administration, the most frequent being polyphagia (26%) and polydipsia (21%). Only 10% of owners reported bronchodilator-associated side effects, with restlessness (9%) being the most common. Difficulties giving glucocorticoid or bronchodilator tablets orally were reported for 33% and 71% of owners, respectively. Glucocorticoid or bronchodilator inhalant therapies were difficult to administer for 28% and 31% of owners, respectively. Frequency and severity of coughing were significantly lower after at least 2 months of treatment, with median numerical input on a slider scale (0–100) of 48 and 42 before, and 10 and 7 after treatment, respectively ( $P < 0.0001$ ). Median numerical input of owner satisfaction was 83%.

**Conclusions and relevance** Despite significant improvements in client-reported responses to treatment, challenges associated with the administration of medications and their adverse effects still exist. Promoting awareness of client experiences can facilitate appropriate follow-up, guidance and empathy to further optimize outcomes.

**Keywords:** Feline asthma; feline chronic bronchitis; glucocorticoids; bronchodilators; inhalant therapy; survey; questionnaire

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## Introduction

Chronic coughing is a serious medical condition in cats worldwide with multiple possible etiologies, such as feline asthma (FA), feline chronic bronchitis (FCB), bacterial bronchopneumonia, viral pneumonia, lower airway parasitism, fungal pneumonia, intrathoracic neoplasia, smoke inhalation, lower airway foreign body and primary bronchiolar disorders.<sup>1–5</sup> FA and FCB are the most common causes of chronic coughing and are frequently referred to under the umbrella term of ‘feline

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lower airway disease' (FLAD).<sup>6</sup> FLAD frequently requires long-term management with the therapeutic goal of lessening the severity and frequency of coughing attacks and, ultimately, improving overall quality of life. Client education is critical in the management of FLAD, so that they develop realistic expectations of the effectiveness of treatments and the potential for complications and challenges.<sup>7</sup>

The traditional FLAD therapeutic approach primarily involves glucocorticoid and bronchodilator use,<sup>4</sup> with a variety of administration challenges.<sup>1</sup> Substantial challenges with oral medication administration to cats have been reported, and include difficulties maintaining the medication schedule, individual cat behavior, reluctance to swallow, vomiting, hypersalivation and prolonged esophageal transit time leading to medication-induced esophagitis/stricture after 'dry swallowing' solid medication.<sup>8–11</sup> In addition, long-term inhaled glucocorticoid therapy for FLAD can also be challenging as almost half of the owners in one study discontinued treatment after at least 2 months.<sup>9</sup>

The voices of clients managing cats with FLAD are therefore an invaluable source of information. Capturing these experiences and perceptions will ultimately inform veterinarians of the client perspective, thereby facilitating future client education. To the authors' knowledge, limited survey data gathered directly from owners caring for cats with FLAD have been reported. The first aim of this survey was to cultivate a better understanding of client treatment practices, and identify challenges and adverse effects associated with the administration of commonly used medications for FLAD, particularly glucocorticoids and bronchodilators. The second aim was to ascertain client perception of response to treatment and level of satisfaction.

## Materials and methods

A prospective cross-sectional study was conducted. A 32-question, web-based survey was designed and advertised online to owners and veterinarians via email (veterinary medical associations [in Canada, the USA, UK and France]), social media (Facebook [professional veterinary groups, feline foundations, FLAD support groups], LinkedIn) and institution websites (University of Saskatchewan, Vet Professionals). The survey was posted online for 3 months (October to December 2020) for public participation. The survey was open to any cat owner over 18 years old living with a cat diagnosed with a chronic coughing disorder lasting or requiring treatment for longer than 2 months. Owners could only complete the survey once for one cat per household (the most recently diagnosed cat). Survey questions evaluated cats' signalment, environment, history and clinical signs, diagnosis, medications and side effects, owner satisfaction, and frequency and severity of coughing at the time of

initial diagnosis and 2 months after starting treatment (see Appendix A in the supplementary material). This survey was approved by the University of Saskatchewan Behavioral Research Ethics Board (Beh-REB #2140).

Questions were multiple choice with single (nine questions) or multiple answer (10) options, short answer (eight) or slider scale with hidden numerical input (five) in design. Specifically, frequency and severity of coughing and owner satisfaction were assessed by a slider scale with hidden numerical input between 0 and 100. Numerical input '0' referred to the lowest frequency, severity or satisfaction whereas the numerical input '100' referred to the highest frequency, severity or satisfaction. Short answers were evaluated and grouped according to the similarity of their content. Participation was voluntary and responses were kept anonymous and confidential. Survey withdrawal was anonymous and possible at any time before submission of survey responses. By completing and submitting the questionnaire, owners gave permission for data to be used for research, publication and teaching.

The survey was collated and stored using Survey Monkey (SVMK), and the data were subject to Canadian data collection laws. IP addresses were collected but not shared or used in this study. Data were then downloaded into a Microsoft Excel spreadsheet for analysis. Cats not reported to have FLAD were excluded. Cats with concurrent reported cardiorespiratory disorders, or that tested positive for feline immunodeficiency virus or feline leukemia virus, were further excluded. Statistical analyses were performed, and graphs produced, using a commercial software package (GraphPad PRISM9 software version 9.1.0). For continuous data (ie, slider scale), non-parametric tests were used since Gaussian distribution was not assumed. The Mann–Whitney test was used for continuous non-paired data, and the Wilcoxon matched-pairs signed rank test for continuous paired data. *P* values <0.05 were considered significant.

## Results

There was a total of 281 respondents, with 221 complete and 60 partial survey responses. Median time for survey completion was 8 mins 29 s. Five complete responses were identified as duplicates and subsequently excluded. Eight responses were excluded because the duration of coughing was less than 2 months (*n* = 2) or unknown (*n* = 6). Cats without FA or FCB were excluded (*n* = 25). Thirty cats were further excluded since they had been reported with concurrent cardiorespiratory disorders (*n* = 17 cats with bacterial bronchopneumonia, *n* = 3 with lower respiratory tract parasitism, *n* = 1 with fungal pneumonia, and *n* = 6 with heart diseases) or tested positive for feline immunodeficiency virus (*n* = 3) or feline leukemia virus (*n* = 1). A total of 153 complete responses describing cats with FA or FCB (FLAD cats) were analyzed.

**Table 1** Age and weight distributions for sample population of cats with feline lower airway disease (n = 153)

Signalment	Prevalence
<b>Breeds</b>	
Domestic shorthair	92/153 (60%)
Domestic longhair	13/153 (8%)
Domestic mediumhair	7/153 (5%)
Ragdoll	3/153 (2%)
Bengal	3/153 (2%)
British Shorthair	3/153 (2%)
Munchkin	3/153 (2%)
Others (18 other breeds)	26/153 (17%)
Unknown	3/153 (2%)
<b>Age</b>	
<1 year of age	0/153
1–3 years old	25/153 (16%)
4–6 years old	22/153 (14%)
7–9 years old	41/153 (27%)
10–12 years old	29/153 (19%)
13–15 years old	22/153 (15%)
>15 years old	14/153 (9%)
<b>Weight</b>	
<3kg	5/153 (3%)
3–3.9kg	24/153 (16%)
4–4.9kg	44/153 (29%)
5–5.9kg	52/153 (34%)
6–6.9kg	13/153 (8%)
7–7.9kg	8/153 (5%)
8–8.9kg	2/153 (1%)
9–9.9kg	3/153 (2%)
>10kg	1/153 (1%)
Unknown	1/153 (1%)

The majority of responses were from Canada (49/153, 32%), the USA (50/153, 33%) or the UK (20/153, 13%), accounting together for 78% (119/153) of total responses. Thirteen other countries (Australia, China, Finland, France, Germany, Ireland, Israel, Italy, Malaysia, Netherlands, Portugal, South Africa, Thailand) were represented by a range of 1–7 (0.7–5%) participants.

#### *Descriptive data for sample population of cats with feline lower airway disease*

Most cats were of the domestic breed (92/153, 60%). Other breeds are summarized in Table 1. Sex distribution was almost equal, with 86 (56%) male and 67 (44%) female cats. Almost all cats were sterilized (152/153, 99%). The age and weight distribution at the time of questionnaire completion are detailed in Table 1.

Most cats lived strictly (92/153, 60%) or predominantly (59/153, 39%) indoors. Two cats (1%) lived strictly or predominantly outdoors. Most owners were non-smokers

(133/153, 87%). Among the 20 smokers, 14 (70%) smoked only outside, six (30%) smoked inside and outside, and none smoked only inside. Eleven owners smoked cigarettes (7 q24h, 2 q48h, 2 q1week), one smoked a hookah pipe (q24h), eight smoked cannabis (1 q24h, 1 q48h, 3 q1week, 3 q1month), none vaped e-cigarettes and none smoked cigars or pipes.

#### *Concurrent respiratory disorders and non-respiratory comorbidities*

Cats with concurrent reported cardiorespiratory disorders (n = 27) or that tested positive for feline immunodeficiency virus (n = 3) or feline leukemia virus (n = 1), were excluded. Non-cardiorespiratory comorbidities included 11/153 (7%) chronic enteropathies, 7/153 (5%) chronic kidney disease, 6/153 (4%) environmental skin allergies, 4/153 (3%) lower urinary tract disease, 4/153 (3%) hyperthyroidism, 3/153 (2%) diabetes mellitus, 3/153 (2%) chronic constipation and 2/153 (1%) urolithiasis.

#### *Characteristics of cough*

Most owners were dealing with considerable chronic coughing: 2–6 months (n = 15, 10%), 7–11 months (n = 15, 10%), 1–2 years (n = 50, 33%), 3–4 years (n = 33, 22%) and ≥5 years (n = 40, 25%).

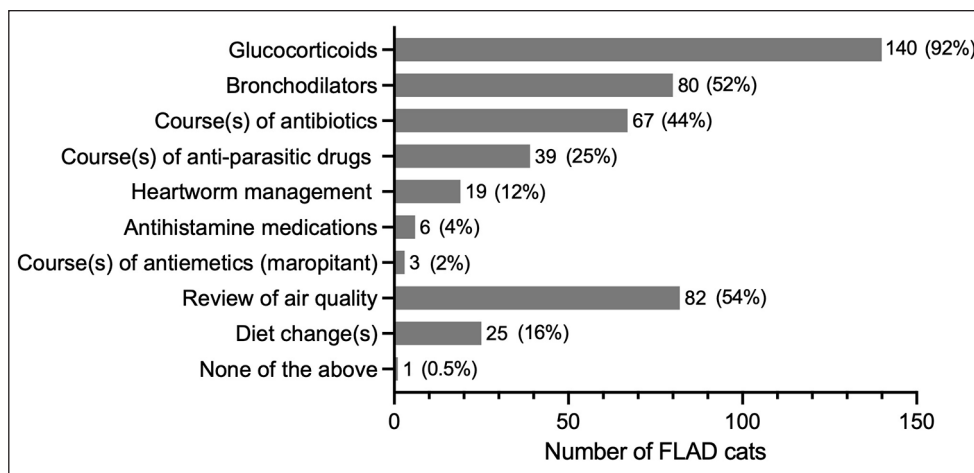
A loud (harsh) cough was more frequently reported (85/153, 56%) than a quiet (soft) cough (52/153, 34%). Owners also reported the following clinical signs: wheezing with cough (77/153, 50%), swallowing immediately after coughing (53/153, 35%), open-mouth breathing (26/153, 17%) and coughing up fluid on the floor (8/153, 5%). Owners also reported the following clinical signs in the short answer questions: extended neck (n = 3), increased respiratory rate (n = 3), dry cough (n = 2), wet cough (n = 3), hacking noises similar to vomiting up hairballs (n = 1) and sneezing immediately before or after coughing (n = 2).

#### *Medical management*

**Medications** Medical management is summarized in Figure 1. Glucocorticoids and bronchodilators were prescribed for 140/153 (92%) and 80/153 (52%) cats, respectively.

**Routes of administration** Glucocorticoids and bronchodilators were predominantly administered orally (90/140, 64%; 17/80, 21%) or by an inhalant device (105/140, 75%; 70/80, 88%), respectively (Table 2).

**Non-medication management** A review of air quality with appropriate changes was conducted for 82/153 (54%) cats. Diet change(s) were tried for 25 (16%) cats. Six (4%) owners mentioned in open short-answer questions using adjunctive homeopathy and/or acupuncture.



**Figure 1** Medical management of cats with feline lower airway disease (FLAD) (n = 153)

**Table 2** Routes of administration of glucocorticoids and bronchodilators in cats with feline lower airway disease (n = 153)

Routes of administration	Prevalence for glucocorticoids (n = 140)	Prevalence for bronchodilators (n = 80)
Inhalant device	105/140 (75%)	70/80 (88%)
PO	90/140 (64%)	17/80 (21%)
Subcutaneous, intramuscular	24/140 (17%)	0/80 (0%)
Transdermal	0/140 (0%)	0/80 (0%)

**Side effects** Almost half (60/140, 43%) of owners reported adverse effects secondary to glucocorticoid administration, the most frequent being polyphagia (37/140, 26%) and polydipsia (30/140, 21%). Only 8/80 (10%) of owners reported side effects with bronchodilator use, in particular restlessness (wandering, pacing, agitation, etc) being noted in 7/80 (9%) cats (Table 3).

#### Difficulties/challenges with administering medication

Owners experienced many difficulties when using glucocorticoids and bronchodilators. Difficulties giving glucocorticoid or bronchodilator tablets orally were reported for 33% (30/90) and 71% (12/17) of owners, respectively. Glucocorticoid or bronchodilator inhalant therapies were difficult to administer for 28% (29/105) and 31% (22/70) of owners, respectively. Pet owners perceived that their relationship with the cat had changed negatively for 12% (17/140) of owners administering glucocorticoids and 10% (8/80) of owners administering bronchodilators. Among 115 cats receiving multiple ( $\geq 2$ ) medications, one owner found that multiple medications were easily confused for one another. Other difficulties experienced by owners are detailed in Table 4. In an open-ended short-answer question, one owner reported the smell of the salbutamol was repulsive.

**Air quality management** Owners were asked in an open-ended short-answer question if they had reviewed the

air quality in the house with their veterinarian and if they had made changes to improve it. Air quality was reviewed for 82/153 (54%) cats. The most common changes implemented to improve air quality focused on litter and home perfume management. Twenty-three percent of owners (35/153) decreased or stopped using air perfumes (air fresheners, scented products, candles, incenses, essential oils, etc). Twenty-one percent of owners (32/153) made litter changes, switching to unscented and/or lower-dust litters (ie, paper-based litter, silica crystal sand, corn-based litter, compressed wood pellets). When using hooded cat litter boxes, some owners elected to leave the litter box open. Other changes made in home environments to increase air quality are detailed in Table 5.

**Dietary modifications** Diet was specifically changed for 25 cats (16%). Reported diet characteristics included low-calorie formulation (n = 4), hypo- or anallergenic formulation (n = 14) and grain-free formulation (n = 3). Seven cats that were switched to a wet diet reportedly had fewer coughing episodes when eating.

#### Response to treatment

Frequency of coughing was significantly lower after at least 2 months of treatment, with a median numerical input on the slider scale of 48 (range: 3–84) before and 10 (range: 0–97) after treatment ( $P < 0.0001$ ). Severity of cough was

**Table 3** Reported side effects of glucocorticoids and bronchodilators used in the medical management of feline lower airway disease (n = 153)

Side effects of treatment	Prevalence for glucocorticoids (n = 140)	Prevalence for bronchodilators (n = 80)
Total	60/140 (43%)	8/80 (10%)
Polyphagia	37/140 (26%)	NR
Polydipsia	30/140 (21%)	NR
Polyuria	11/140 (8%)	NR
Muscle waste	10/140 (7%)	NR
Haircoat changes	9/140 (6%)	NR
Diarrhea	4/140 (3%)	1/80 (1%)
Hyporexia	4/140 (3%)	1/80 (1%)
Vomiting	4/140 (3%)	1/80 (1%)
Diabetes mellitus	2/140 (1%)	NR
Hypodipsia	2/140 (1%)	NR
Urinary tract infections requiring antibiotic treatment	2/140 (1%)	NR
Restlessness (wandering, pacing, agitation, etc)	NR	7/80 (9%)
Tremors, convulsions or seizures	NR	0/80 (0%)
Systemic hypertension	NR	0/80 (0%)
No side effects	71/140 (51%)	64/80 (80%)
Owner unsure	9/140 (7%)	8/80 (10%)

NR = not inquired in multiple choice questions and not reported in open-ended short-answer questions

**Table 4** Difficulties experienced by owners when using glucocorticoid and bronchodilator medications in the management of feline lower airway disease (n = 153)

Difficulties experienced by owners	Prevalence for glucocorticoids (n = 140)	Prevalence for bronchodilators (n = 80)
Patients receiving PO medication	n = 90	n = 17
Problems giving pills orally	30/90 (33%)	12/17 (71%)
Problems giving liquid medication orally	11/90 (12%)	2/17 (12%)
Patients receiving inhalant medication	n = 105	n = 70
Problems giving inhalant therapy	29/105 (28%)	22/70 (31%)
Patients receiving subcutaneous or intramuscular injections	n = 24	n = 0
Problems taking cat into the veterinary clinic for injections	8/24 (33%)	NA
Problems giving injections	4/24 (17%)	NA
The relationship between the owner and the patient changed in a negative way	17/140 (12%)	8/80 (10%)
Medications were too expensive	17/140 (12%)	3/80 (4%)
None of the above difficulties	77/140 (55%)	45/80 (56%)
Owner unsure	1/140 (1%)	0/80 (0%)

NA = not applicable

also significantly decreased after treatment with a median numerical input on the slider scale of 42 (range: 0–100) before and 7 (range: 0–93) after treatment ( $P < 0.0001$ ) (Figure 2).

#### Owner satisfaction

Overall, median numerical input of owner satisfaction was 83 (range: 2–100) (Figure 2). Notably, 43 owners

mentioned a numerical input score of satisfaction of 100. Considering the median numerical input of 80 for owner satisfaction (Figure 2), the differences between the frequency of coughing pre- and post-treatment ( $\Delta = \text{Frequency}_{\text{pre}} - \text{Frequency}_{\text{post-treatment}}$ ) for owners with a satisfaction  $<$  or  $\geq$  to 80 were significantly different (median of 25 and 35, respectively,  $P = 0.0008$ ). The differences between the severity of cough pre- and



**Table 5** Changes to improve air quality at home reported by owners caring for cats with feline lower airway disease (n = 153)

Reported changes to improve air quality at home	Prevalence
Decreased/stopped air perfumes	35 (23%)
Changed litter	32 (21%)
Air purificator systems	28 (18%)
Active house cleaning: vacuuming more, cleaning more	18 (12%)
Home humidifier (industrial or door let open during showers)	15 (10%)
Change to natural and/or hypoallergenic cleaning products	7 (5%)
Decreased smoke from tobacco or fire*	7 (5%)
Increasing home ventilation (opening doors and exhaust/extractor fans)	5 (3%)
Vacuum filters	5 (3%)
Removed carpets	5 (3%)
Stopped use of personal perfumes	3 (2%)
More frequent furnace filter changes	2 (1%)
Unscented and/or hypoallergenic laundry detergent	1 (0.5%)

\*Compiled client feedback: changes in smoking habits (stop smoking [n = 2] or smoking outside [n = 2]), increased ventilation when cooking or having a fire (n = 1), stopped use of fireplaces (n = 2)

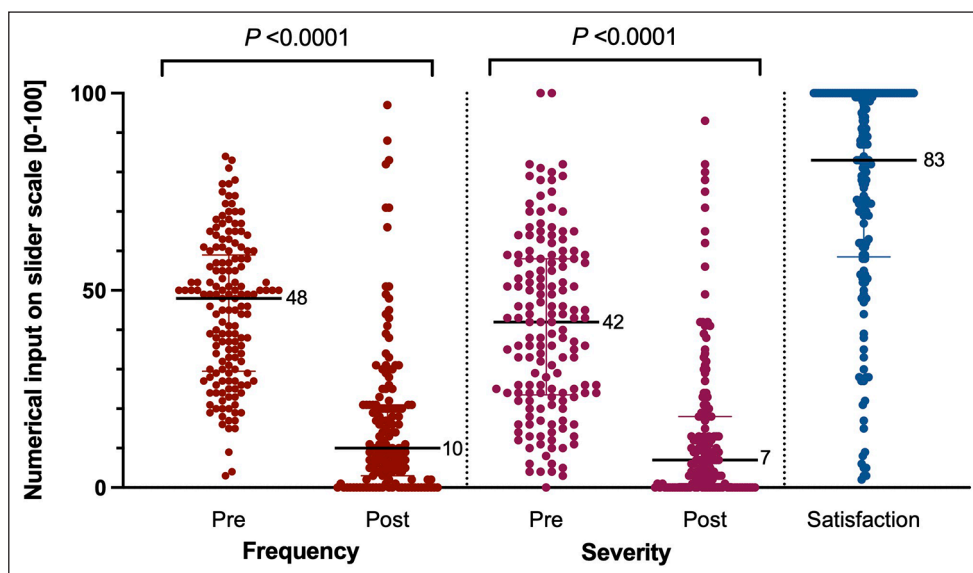
post-treatment ( $\Delta = \text{Severity}_{\text{pre}} - \text{Severity}_{\text{post-treatment}}$ ) for owners with a satisfaction  $<$  or  $\geq$  to 80 were also significantly different (median of 19 and 31, respectively,  $P = 0.002$ ) (Figure 3).

### Discussion

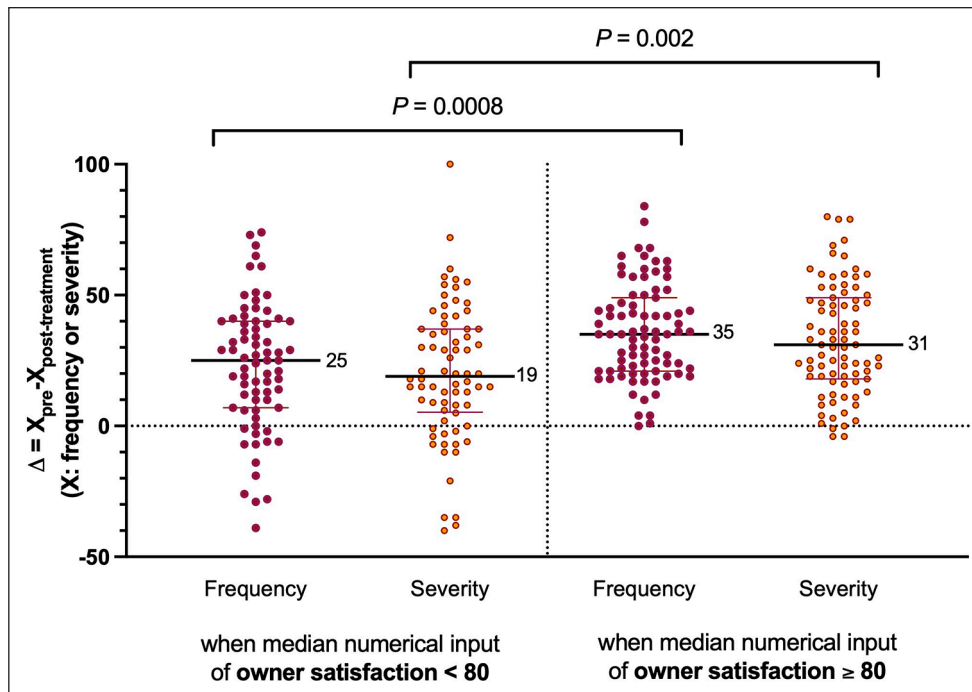
The primary aim of the current study was to capture the rate and nature of commonly used therapeutic approaches and the challenges associated with them.

As anticipated, oral medication administration was collectively associated with the most client-reported challenges for both glucocorticoids (pill: 33%, 30/90; and liquid: 12%, 11/90) and bronchodilators (pill: 71%, 12/17; and liquid: 12%, 2/17). In addition, these data suggest that pills were reported to be more difficult to administer than liquid medications. These results are similar to a recent e-survey reporting that oral medication dosages were not given as prescribed by 24% (16/67) of the respondents, which emphasizes the challenges associated with the oral route of administration.<sup>8</sup> In that 2017 e-survey, most clients (22/38, 58%) preferred a solid medication formulation over the 4.8-fold more palatable liquid suspensions, chosen by 4/38 (11%) owners, presumably due to client familiarity with the widespread ‘dry swallowing’ method of solid medication administration.<sup>8</sup> Clients had the opportunity to elaborate on treatment-associated difficulties and preferences in an open-ended short-answer format appearing as a text box in the survey both within individual questions and at the end of that section. Unfortunately, the qualitative data collected did not address whether solid or liquid medication might be preferred.

Approximately one quarter (28%) and a third (31%) of the surveyed owners reported difficulties administering inhalant glucocorticoids or bronchodilators, respectively. These findings are compatible with another study describing the long-term use of inhaled budesonide in 43



**Figure 2** Numerical input on slider scale (0–100) of the frequency and severity of cough pre- and post-treatment, and of the satisfaction of owners caring for cats with feline lower airway disease (n = 153). Frequency and severity of cough, and owner satisfaction were all assessed after at least 2 months of treatment



**Figure 3** Comparison of the differences between the severity and frequency of cough pre- and post-treatment for owners with a satisfaction  $<$  or  $\geq$  to the numerical input 80 (0–100 scale), in the surveyed cats with feline lower airway disease ( $n = 153$ )

cats with FLAD, for which therapy had been withdrawn by 47% (20/43) of owners, reportedly due to owner compliance ( $n = 12$ ), cat compliance ( $n = 4$ ) and drug ineffectiveness ( $n = 4$ ).<sup>9</sup> Open-ended short-answer questions in our survey collected some responses as to why this subpopulation of clients found inhalant therapy challenging to administer (eg, the patient breath holds, moves uncooperatively or is disturbed by the sounds of an inhalant device). To the authors' knowledge, direct comparisons of owner and cat compliance with oral, liquid and inhalant therapies have not been well studied for FLAD.

In the current study, about half (43%) of the surveyed owners reported adverse effects secondary to glucocorticoid administration. As systemic glucocorticoid administration may lead to serious adverse effects and may be contraindicated in certain patients, inhaled glucocorticoids appear to be advantageous due to maximized local drug deposition and minimized systemic exposure.<sup>4,9,12</sup> Although oral glucocorticoids were reported to be more prevalent than inhalant forms in the literature,<sup>1</sup> glucocorticoids were preferentially administered by an inhalant device in the present study. Hence, adverse effects of corticosteroids may have been underestimated in the current study. The survey participants are likely to represent the most dedicated cat owners, which is likely to have impacted the choice of glucocorticoids forms and the diligent reporting.

The secondary aim of this e-survey attempted to ascertain client perception of response to treatment for presumed FA and FCB, in terms of cough frequency and severity, and their level of satisfaction with the current management regime. Frequency and severity of coughing were significantly lower after at least 2 months of treatment, mainly including glucocorticoids (92%), bronchodilators (52%) and air quality management (54%). These findings are similar to multiple retrospective studies that have documented some degree of beneficial clinical response to oral or parenteral glucocorticoids and/or bronchodilators in cats with FLAD.<sup>1,9,13–17</sup> However, cats with FLAD can have occasional and brief episodes of cough separated by long periods without clinical signs.<sup>1</sup> Therefore, this survey does not catch the variations in the client's perception of response to treatment during asymptomatic periods and acute episodes, and the owner perception of a highly effective treatment may be explained by the absence of recent exacerbations. Although treatment response for FLAD is ideally assessed by monitoring airway inflammation or hyper-responsiveness, it is often based on improvement in clinical signs, which represents a limitation to our survey and previous studies.<sup>14–17</sup>

There is, however, a scarcity of survey data reporting treatment responses from the client's perspective after 2 months or longer of providing in-home medical care

for FLAD. Educating these clients that positive outcomes are possible is evidenced in this study by significant decreases in the frequency and severity of coughing, and good overall owner-reported satisfaction with the cat's response to the treatment regime. To exemplify, the surveyed owners reported a median numerical satisfaction input of 83 on a 0–100 scale with 28% of owners reporting a satisfaction of 100%. In the current study, decrease in the frequency and severity of coughing seemed to be associated with an increased owner satisfaction. The goal is to empower cat owners so that their dedication to long-term treatment and its possible associated challenges and side effects is balanced by the likely potential for a positive outcome, as reported by the cohort of respondents to this survey.

There are significant limitations to the results generated by this survey. A relatively small number of responses ( $n = 153$ ) were collected compared with other similar owner experience surveys which had 111,<sup>18</sup> 468,<sup>19</sup> 748,<sup>20</sup> 859<sup>21</sup> and 1089<sup>22</sup> participants. Cat owners could not be randomly surveyed to minimize the innate biases that are associated with survey data. A participation bias may have occurred as it may be more likely that dedicated or optimistic owners would take the time to complete this time-consuming voluntary questionnaire, and these clients may not represent the 'average' cat owner. Our survey also selected for cat owners with online access and active social media profiles. Therefore, the responses received may not be representative of the full population, and participation/non-respondent bias have to be taken into account.

The survey relied on the clients remembering details of their cat's diagnosis and management rather than medical record review (possible recall bias). Therefore, there is no way to ensure that reported FLAD cats enrolled in the survey had actually been diagnosed with FA or FCB. In addition, adequate understanding of the survey questions and reliable information reporting by respondents cannot be ensured. Social acceptability bias may have resulted in some owners providing responses that they believed were expected of them. Collectively, these inherent biases may contribute to subjectivity of the survey data collected. Finally, the study design did not include collection of information regarding the type and dosage of administered treatments, which was intentionally decided upon to maximize client response rates by not overwhelming respondents and significantly extending the survey completion time.

## Conclusions

Understanding the cat owner's successes and struggles with FLAD management is paramount to cultivating feline practitioner-client communication and empathy. Although FLAD management often requires long-term management with potential side effects and challenges for clients, this e-survey emphasized the substantial

treatment efficacy and satisfaction from an owner perspective, with a significant decrease in both frequency and severity of coughing.

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**Supplementary material** The following file is available online:

Appendix A – survey questions.

**Conflict of interest** The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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**Ethical approval** This work involved the use of non-experimental animals (owned) and procedures that differed from established internationally recognised high standards ('best practice') of veterinary clinical care for the individual patient. The study therefore had ethical approval from an established committee as stated in the manuscript.

**Informed consent** Informed written consent was obtained from the owner or legal custodian of all animals described in this work (non-experimental animals) for the questionnaire submission. No animals or people are identifiable within this publication, and therefore additional informed consent for publication was not required.

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