Development and evaluation of a canine and feline welfare assessment tool for use in companion animal veterinary clinics

by

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ABSTRACT

DEVELOPMENT AND EVALUATION OF A CANINE AND FELINE WELFARE ASSESSMENT TOOL FOR USE IN COMPANION ANIMAL VETERINARY CLINICS

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This thesis was conducted to investigate canine and feline welfare in relation to veterinary care through the development and evaluation of a welfare assessment tool for veterinary clinics. Through a multi-stage survey, 78 animal welfare researchers, veterinarians with an expertise in animal welfare, and practicing veterinarians identified 85 veterinary care-related factors thought to impact companion animal welfare in the clinic and home environments. Factors with the highest perceived relative impact on welfare included veterinary-client communication of welfare-related information, analgesic regimes, and the ability to recognize and interpret patient behaviour. These results served as the basis for an animal welfare assessment tool, incorporating management- and resource-based measures of animal welfare that were assessed via questionnaires, interviews with veterinarians, and veterinary appointment observation through video recording. This tool was evaluated for reliability, validity and feasibility in 30 companion and mixed animal veterinary clinics in southern Ontario. Inter-observer reliability (two trained, inexperienced observers vs. one experienced observer) was highest for interviews ($K_w = 0.40, 0.44$ for aspects of communication; $K_w = 0.83, 0.73$ for pain management, $K_w = 0.82, 0.81$ for behavioural health). Intra-observer reliability (one experienced observer only) was high across all three assessment methods ($K_w \geq 0.80$ for communication, pain...
management and behavioural health). Due to their ease of use, questionnaires and interviews had high feasibility for use in a welfare assessment tool; however, discrepancies between responses given through questionnaires and interviews and data from appointment observation suggest that they have lower validity as a method for accurately assessing welfare-related veterinary practices. Results also provide insight into current veterinary practices related to animal welfare. Other than veterinary preventive care, veterinary staff engaged in low levels of proactive discussion of a number of important welfare-related topics, highlighting a missed opportunity for client education. Veterinary clinics consistently provided pre-emptive and post-surgical analgesia for ovariohysterectomies; however, many underused objective pain identification tools and provided owners with a shorter-than-recommended duration of analgesia post-ovariohysterectomy. Veterinary staff often approached and examined patients in a non-threatening manner, but generally underused low-stress handling techniques. There is, therefore, opportunity for enhancement in welfare-related practices across many areas.
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STATEMENT OF WORK

Dr. Lee Niel secured project funding through the Ontario Veterinary College Pet Trust Fund. Lauren Dawson, under the guidance of Dr. Lee Niel, obtained University of Guelph Animal Care Committee and Research Ethics Board approvals for all research projects. Lauren Dawson designed the general methodological approaches used in this thesis, under the guidance of Dr. Lee Niel, and with on-going discussion with members of her advisory committee, Dr. Cate Dewey, Dr. Elizabeth Stone and Dr. Michele Guerin.

Chapter 1: Introduction and literature review

Lauren Dawson conducted literature searches of various databases to identify relevant articles to review. The initial draft of the manuscript was written by Lauren Dawson, with review and editing provided by Dr. Lee Niel. Additional revisions were provided by Dr. Cate Dewey and Dr. Elizabeth Stone.

Chapter 2: Multi-stage survey

Lauren Dawson developed the survey questions, under the guidance and advisement of Dr. Lee Niel, and with additional input from Dr. Cate Dewey, Dr. Elizabeth Stone, and Dr. Michele Guerin. Lauren Dawson compiled the invitation lists, and managed and cleaned all survey response data. Content analysis was conducted by Lauren Dawson, under the guidance of Dr. Lee Niel. Statistical analysis was conducted by Lauren Dawson, with assistance from William Sears as needed. The initial draft of the manuscript was written by Lauren Dawson, with input, review and editing provided by Dr. Lee Niel. Additional revisions were provided by Dr. Cate Dewey, Dr. Elizabeth Stone and Dr. Michele Guerin.
Chapters 3 to 5: In-clinic assessment using the draft welfare assessment tool

Lauren Dawson developed the questionnaire and interview script, under the guidance and advisement of Dr. Lee Niel. Additional input was provided by Dr. Cate Dewey, Dr. Elizabeth Stone, and Dr. Michele Guerin. Veterinary clinic invitation lists, recruitment and scheduling were completed by Denise Yates, Brittany Lostracco and Lauren Dawson. Lauren Dawson completed all veterinary clinic visits and collected all questionnaire, interview and appointment observation data, with the assistance of Brittany Lostracco. Verbal interviews were manually transcribed by Lauren Dawson and Brittany Lostracco.

Lauren Dawson developed the questionnaire, interview, and veterinary appointment scoring schemes, through collaboration with and the advisement of Dr. Lee Niel. Lauren Dawson scored all questionnaires, interviews and videos of veterinary appointments, and trained all additional observers. Melissa Speirs and Bailey Kleefstra acted as observers 2 and 3, and each scored all questionnaires and interviews for inter-observer reliability analysis. Angela Tiessen and Kristen Dienst acted as observers 4 and 5, and each scored all veterinary appointment videos for inter-observer reliability analysis. All scoring data was entered by Lauren Dawson, Melissa Speirs, Bailey Kleefstra, Hailey Hoffman and Delaney Miller. Statistical analysis was conducted by Lauren Dawson, with assistance from William Sears as needed. The initial drafts of each of the manuscripts were written by Lauren Dawson, with input, review and editing provided by Dr. Lee Niel. Additional revisions were provided by Dr. Cate Dewey, Dr. Elizabeth Stone and Dr. Michele Guerin.
Chapter 6: General discussion

The initial draft of the manuscript was written by Lauren Dawson, with review and editing provided by Dr. Lee Niel. Additional revisions were provided by Dr. Cate Dewey and Dr. Elizabeth Stone.
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CHAPTER ONE

Introduction and Literature Review

Animal welfare uses information obtained through scientific means to guide our actions towards the treatment of animals; it is thus both science- and value-based (Fraser 2008a). There is no consensus amongst the scientific community as to the definition of animal welfare, since personal definitions can be affected by individuals’ values and priorities (Fraser et al 1997). Nonetheless, a few general concepts have emerged and the ‘three circles’ approach, encompassing biological functioning, affective states and natural living, is often referenced when discussing factors that contribute to overall animal welfare (Fraser et al 1997). Biological functioning includes considering the animal’s fitness, in terms of measures such as health status, reproduction, and productivity. By this definition, if an animal were diseased or injured, or if stressors were impairing reproduction and growth, their welfare would be impaired. Conversely, if an animal is not experiencing physiological stress, is successfully coping with its environment, and is able to satisfy its life-sustaining and health-sustaining needs (e.g. food), then the animal would be considered to have good welfare (Duncan 2005). The affective states circle relates specifically to the animal’s feelings, with a focus on encouraging positive affective states (e.g. play, exploration, pleasure) and reducing negative affective states (e.g. fear, pain, hunger, frustration) (Fraser et al 1997). According to this circle, performing a surgical procedure on a dog without anesthesia and analgesia would negatively impact their welfare, due to the painful feelings induced by the procedure. Thirdly, natural living relates to the animal’s ability to perform its full behavioural repertoire, thus fulfilling the full ‘nature’ of their species (Fraser et al 1997). In the case of companion animals, preventing a cat from scratching, which is a natural feline behaviour, would compromise the cat’s welfare. Each circle has limitations. For instance,
it is difficult to determine cut-off points to distinguish good from poor welfare in terms of biological functioning, affective states can only be measured indirectly, and it might be difficult to define the true ‘nature’ of an animal, particularly for domesticated species that have developed behavioural adaptations to the captive environment (Fraser et al 1997). Due to these limitations, it is difficult to assess animal welfare from the viewpoint of only one circle, since each requires the others for support (Fraser et al 1997). Moreover, while each circle overlaps with the others, this overlap is not perfect, and one circle cannot be used to solely cover all aspects of animal welfare (Fraser et al 1997, Fraser 2008a). Nonetheless, from a fundamental point of view, many animal welfare scientists place primary emphasis on a single circle, with consideration for the others only due to the overlap with their main focus. For instance, scientists with a primary concern for affective states (e.g. Duncan 2005) might be interested in injuries largely due to the pain induced with the associated tissue damage, or might be interested in abnormal behaviours in so far as they reflect frustration.

While discussions of animal welfare have traditionally focused on reducing negative welfare, the promotion of positive welfare has recently begun to receive increased attention, with the idea that good welfare on a holistic level is not simply the absence of negative affective states or aversive situations, but also the presence of positive states and outcomes (Boissy et al 2007, Mellor 2012). For instance, rather than simply focusing on the avoidance of hunger, which is a negative affective state, we could also support exploratory and foraging behaviour, which would support positive welfare through mental engagement (Mellor 2012). Including positive aspects allows animal welfare to be measured along a continuous scale, whereby a net positive welfare status can be obtained by minimizing negative states relative to the number or magnitude of positive states (Yeates and Main 2008); if we focus exclusively on reducing negative states, we
would be promoting a neutral animal welfare state, whereas incorporating positive states moves past this neutral state (Mellor 2012). Quality of life is an extension of this concept, which focuses on individual animals rather than groups and an overall positive balance, whereby sustained factors are weighted more heavily than transient factors (Green and Mellor 2011). Others have suggested scaling quality of life up even further, accounting for this welfare balance across the animal’s whole life, to include concepts such as providing animals with ‘a life worth living’ (Yeates 2011). Discussions concerning the welfare of companion dogs and cats have increasingly incorporated these concepts of positive welfare, overall quality of life and consideration of what constitutes ‘a life worth living’.

**Welfare assessment in theory**

*General issues*

Assessing animal welfare is not always straightforward. Welfare assessment is complicated by an inability to access animals’ thoughts to directly measure affective states (Duncan 2005). Nonetheless, anatomical, physiological, and behavioural similarities between non-human animals and humans can provide evidence of a similar ability to have particular positive and negative experiences (Sandøe & Simonsen 1992). Overall, although animal welfare science is not able to conclusively prove poor welfare, it can provide solid evidence through which inferences can be drawn (Duncan 2005, Mason & Mendl 1993).

Additionally, measures of welfare do not always co-vary (Mason & Mendl 1993). For example, when using multiple measures of welfare, data from one measure might suggest poorer welfare while data from the other might suggest no change, or even improved welfare (Mason & Mendl 1993). Similarly, multiple research studies using similar types of measures (e.g.
physiological data) can often lead to different results and conclusions, due to any number of factors, including characteristics of the animals being sampled (e.g. age, sex, genetic differences) or different sampling strategies (e.g. time of day) (Edwards 2007, Mason & Mendl 1993, Rushen 1991). Moreover, the interpretation of measures can often be difficult. Establishing cut-off points for behavioural and physiological measures can make welfare assessment more objective, but it is difficult to establish the point at which welfare is compromised (Barnett & Hemsworth 1990, Mason & Mendl 1993, Mendl 1991). For instance, some authors (e.g. Barnett & Hemsworth 1990) have suggested that welfare is compromised when physiological measures show a change of at least 40% or when stereotypies occur 10% of the time in at least 5% of all animals in a herd, but these cut-off points are arbitrary, and it is dangerous to determine that welfare is not at risk below a particular cut-point (Mendl 1991).

Types of animal welfare measures

Animal welfare is typically assessed using at least one of three types of measures: animal-based, resource-based, and management-based measures. Since each measure has its own strengths and weaknesses, and animal welfare encompasses a number of concepts, it is generally recommended that animal welfare assessments employ multiple types of measures to improve validity (Dawkins 1998, Johnsen et al 2001, Waiblinger et al 2001).

Animal-based measures encompass, but are not limited to, assessments of animal behaviour (e.g. behaviours specific to fear or pain states, abnormal repetitive behaviours), physiology (e.g. glucocorticoid concentrations, glucose concentrations, immune reactivity, metabolic rate), and health (e.g. body condition, lameness, disease morbidity, mortality) (Barnett & Hemsworth 1999, Barnett & Hemsworth 2009, Bracke 2007, Johnsen et al 2001). Since
animal-based measures involve observing the animal itself, they are considered to be the most direct measure of animal welfare (Johnsen et al 2001, Kneirim & Winckler 2009). On the other hand, while useful in a controlled research setting, these measures have low practicality for inclusion in on-site assessment schemes: they tend to require highly trained assessors, more effort and time to perform the assessment, and are often less straightforward to interpret (Blokhuis et al 2013, Bracke 2007, Johnsen et al 2001). For instance, the average time needed to record behavioural measures (i.e. social, resting, coughing, sneezing) for the Welfare Quality® assessment protocol in dairy cattle is estimated to be between 145 and 155 minutes per herd (Knieirim & Winckler 2009). For the same assessment protocol, clinical scoring for cleanliness, body condition, and injuries is estimated to take an additional 60 to 195 minutes, depending on the herd size (Knieirim & Winckler 2009). The inclusion of animal-based measures might therefore extend the length of time required to perform an on-site assessment. It is also difficult to determine appropriate cut-off points for certain measures, like an unacceptable level of abnormal behaviour, or to decipher whether measures such as physiological responses reflect more than arousal alone (Dawkins 1998). As such, these measures often require information collected from other types of measures (e.g. aspects of the environment) for accurate interpretation (Bracke 2007, Dawkins 1998); for example, plasma cortisol concentrations can be impacted by activity, which can differ in individually vs. group-housed animals (Bracke 2007). Finally, animal-based measures identify a potential welfare concern, but research linking animal-based measures to the potential source or cause of this concern is often lacking; if the goal is to not only measure but also improve welfare, we must consider causes as well as consequences, which are identified via resource- and management-based measures (Mendl 1991). Animal-based measures are often criticized for being less objective than management- or resource-based
measures, but adequate training and detailed instructions, including specific definitions and ethograms, can improve objectivity so that reliability is as good as other types of measures (Meagher 2009).

Resource-based measures, also sometimes referred to as environment-based measures, include assessing the environment in which animals are kept (e.g. cage or stall sizes, space allowance, surface traction of flooring, temperature and humidity, ammonia levels), and the resources provided to these animals (e.g. water availability, quantity and quality of food, bedding or litter quality, provision of enrichment items) (Barnett & Hemsworth 2009, Johnsen et al 2001). Resource-based measures are generally considered to be objective and highly practical for use in on-site welfare assessments (Main et al 2001). They require little observer training to maintain high inter-observer reliability and are usually easily and quickly assessed, largely because they tend to be measured on a numerical scale (e.g. cage height on a continuous scale) or as presence or absence of an item (e.g. provision of toys) (Johnsen et al 2001). For instance, the resource-based measures incorporated into the Welfare Quality® assessment protocol for dairy cattle are estimated to take approximately one tenth of the time (15 minutes total/farm) required to complete behavioural measures (Knieirim & Winckler 2009). Moreover, these measures tend to remain stable over time, and unlike animal-based measures like behaviour, outcomes are less dependent on the day, season or climate (Edwards 2007, Whay et al 2003). By measuring what is provided to the animals (inputs), they can also help to identify the source of potential welfare problems, and thus, might enable problem solving (Johnsen et al 2001). Conversely, since the provision of resources required to meet welfare needs does not necessarily equate to improved animal welfare, and resource-based measures do not evaluate the effect on the animal itself (the output), they are indirect measures of animal welfare (Bartussek 2001, Edwards 2007, Knierim
& Winckler 2009, Whay et al 2003). For instance, an evaluation of the number of functioning drinkers can identify whether there are a sufficient number for the herd size and act as a proxy measure for the absence of prolonged thirst, but regardless of the number of drinkers, some animals might still remain thirsty (e.g. if drinkers are placed too high or if competition exists) (Main et al 2001).

Management-based measures include the evaluation of practices (e.g. husbandry, stockmanship and human-animal interaction, inspection frequency, access to pasture) and records (e.g. health records, relationship with a veterinarian, standard operating procedures) (Barnett & Hemsworth 2009, Edwards 2007, Johnsen et al 2001, Main et al 2001, Waiblinger et al 2001). Assessment using management-based measures typically involves a questionnaire or interview with staff members and a review of records. As such, they are easily and rapidly used during on-site visits. The strengths of management-based measures are similar to those of resource-based measures: they are highly practical for use in formal assessment schemes, and they permit the identification of areas that might be the cause of welfare problems. Like resource-based measures, management-based measures are also indirect, and because certain management practices do not directly translate to improved welfare, their validity in terms of reflecting the true welfare state of an animal or herd of animals is lower than that of direct measures (i.e. animal-based measures) (Bartussek 2001, Edwards 2007, Knierim & Winckler 2009, Whay et al 2003).

Overall, each type of measure has its limitations. As such, no single type of measure is exclusively ideal for on-site assessment of animal welfare, and a combination of different measures is generally considered most effective.
Reliability, validity, and feasibility

The reliability, validity and feasibility of any given measure should be evaluated prior to its use for animal welfare assessment. An ideal welfare measure should maximize all three properties, such that it is highly reliable between assessors and assessments, a valid measure of the animal’s welfare, and feasible for use in a formal assessment program. The evaluation of reliability tends to take precedence over the evaluation of validity, since an unreliable measure does not permit any measurement at all (Meagher 2009).

Reliability refers to the extent to which a measure is repeatable and consistent, such that similar conclusions can be drawn across multiple individuals and occasions (Martin & Bateson 1993). Three types of reliability are essential for animal welfare assessment: inter-observer reliability, intra-observer reliability, and test-retest reliability. Inter-observer reliability is the agreement between two or more observers when measuring the same individual or event on the same occasion (Martin & Bateson 1993, Meagher 2009). In other words, if multiple individuals independently perform an assessment of the same event and produce similar results, the measure is said to have high inter-observer reliability. Intra-observer reliability is similar, and refers to a single observer’s agreement with oneself when measuring the same sample on two or more occasions (Martin & Bateson 1993, Meagher 2009). Finally, test-retest reliability refers to the agreement between outcomes produced from assessments taken at different times, and is particularly relevant given that animal welfare assessments tend to be performed over extended time intervals (Knierim & Winckler 2009, Meagher 2009). All three types of reliability are important for animal welfare assessment, as the outcome of an assessment should not depend on the individual performing the assessment, nor the occasion on which the assessment was performed; a highly reliable measure should produce similar results and thus lead to similar
conclusions across multiple observers and assessments, assuming no major changes to management and infrastructure have taken place. Reliability can be influenced by a number of factors, including the assessors’ experience, the assessors’ fatigue level, the frequency with which an incident occurs (i.e. a rare vs. frequent event), and the accuracy and completeness of the definitions provided to assessors (Martin & Bateson 1993). Because resource- or management-based measures (e.g. stall dimensions, existence of protocols for animal handling) are less dependent on human perception and interpretation, they are largely considered more objective, and thus more reliable, than animal-based measures (e.g. incidence of stereotypic behaviour) (Meagher 2009). The reliability of more subjective measures can be improved, and observer drift can be mitigated through detailed definitions and scoring criteria (Knierim & Winckler 2009, Martin & Bateson 1993, Meagher 2009). Reliability can also be improved through a reduction in the number of options, categories, or scores that observers can assign, although this is accompanied by a reduced ability to differentiate between various subjects or states (Knierim & Winckler 2009).

Reliability is formally evaluated as a function of the degree of agreement between scores, usually using correlation statistics (e.g. Pearson correlation coefficient, Spearman’s rank correlation coefficient, kappa coefficient) (Martin & Bateson 1993, Meagher 2009). The magnitude of the correlation statistic is the main indicator used to assess reliability, whereby a higher magnitude indicates greater strength of agreement and higher reliability (Martin & Bateson 1993). Although general guidelines for interpretation for the different test statistics do exist, the interpretation of these correlation statistics, and the cut-off points for “high” versus “low” reliability, are somewhat arbitrary (Knierim & Winckler 2009, Landis & Koch 1977, Meagher 2009). Some have argued that a correlation statistic of 0.70 reflects acceptable
reliability, while others have stated that a minimum acceptable cut-off should be set at 0.40 (Fleiss et al 2003, Knierim & Winckler 2009, Martin & Bateson 2007). However, it is likely that interpretation of reliability is not absolute, and instead might vary depending on the purpose of the assessment.

Validity refers to the extent to which a measure truly measures what the researcher intends it to measure (Knierim & Winckler 2009, Martin & Bateson 1993). Valid measures accurately depict true values, are specific to what is being measured, and reflect the scientific phenomenon in question (Martin & Bateson 1993). A measure can have face or content validity, construct validity and/or criterion validity. Face or content validity occurs when a measure is deemed valid according to scientific experts, construct validity occurs with experimental confirmation of an expected relationship, and criterion validity occurs when a given measure correlates as it is expected to with another related or ‘gold standard’ measure (Knierim & Winckler 2009, Meagher 2009). In animal welfare, the construct validity of a measure generally receives more attention than the criterion validity, since ‘gold standards’ do not often exist (Meagher 2009). Moreover, although a measure can be valid in that it properly measures the phenomenon in question, it is possible that it might still not be a valid measure of animal welfare. For instance, plasma, urine and/or fecal corticosteroid concentrations are a valid measure for the activation of the hypothalamic-pituitary-adrenal (HPA) axis (Palme 2012). As an indicator of animal welfare, however, corticosteroid concentration often has poor validity because it lacks specificity; the HPA axis can be activated by aversive situations, such as stress, but can also be activated by non-aversive situations, such as arousal or physical activity (Mason & Mendl 1993, Webster 2005). As the most direct measure of animal welfare, animal-based
Measures are generally considered to have the highest validity, compared to resource- and management-based measures (Knierim & Winckler 2009).

Feasibility refers to the practicality of using any given measure, with respect to whether the measure is possible, practical and worthwhile (Martin & Bateson 1993). If a measure requires too much time, money, personnel, training or effort, it would not be feasible to include it in an animal welfare assessment program. Animal-based measures tend to require more time and personnel because they usually require interacting with the animal itself, and consequently, tend to have lower feasibility (Knierim & Winckler 2009). For instance, approach-avoidance testing, assessment of lameness, and assessment of the incidence of stereotypic behaviour each require evaluation at the individual animal level, a process that is quite time consuming and can extend the duration of the site visit. Conversely, proper sampling strategies, whereby conclusions about the herd or group of animals are based on a subsample of individuals selected for assessment, can improve the feasibility of animal-based measures, as can technological advancements that enable automatic monitoring of animal behaviour (Knierim & Winckler 2009).

Welfare assessment in practice

Goals and applications

The goal(s) of a welfare assessment scheme impact its development, standards (e.g. ambitious vs. status quo), measures (e.g. resource- vs. animal-based) and implementation (e.g. self-audit vs. external auditor). In reviewing nine existing welfare assessment schemes for agricultural species, Johnsen and colleagues (2001) identified five overarching goals: i) welfare certification at the individual farm level, ii) welfare certification at the group of farms level, iii)
assessment of housing systems, iv) identification of welfare issues at the individual farm level, and v) provision of advice to the producer.

The goals of welfare assessments, particularly for agricultural animals, have shifted over time, and welfare assessments have taken different forms as a result. Initially, assessment schemes were created to increase awareness of best practices for the care and welfare of livestock, thus enabling producer education. Recently, however, consumers have shown increasing concern over the manner in which food animals are raised, and have begun to demand animal-friendly products (Blokhuis et al 2003). In response to consumer demands, welfare assessments that ensure compliance against mandatory minimum standards set by buyers and/or industries have begun to be increasingly widespread, particularly in the United States where niche markets and voluntary certification programs are starting to emerge (Mench 2008).

Historically, on-farm welfare assessments have primarily used resource- and management-based measures, although there has also been a shift towards the inclusion of animal-based measures that allow for the direct assessment of welfare (Barnett & Hemsworth 2009).

Fraser (2006) outlined that animal welfare assessment or assurance programs typically take one of five formats: i) non-mandatory codes or guidelines, ii) legislation, iii) international trade agreements, iv) corporate requirements, and v) product labeling or certification. As a whole, assessment schemes for agricultural animals differ in their participation requirement (voluntary vs. mandatory), their degree of enforcement (self-policing vs. third party audit), and the level of consumer assurance that is awarded through implementation.

Non-mandatory codes or guidelines are recommended practices typically authored by industry or government committees (e.g. the Canadian Codes of Practice, the United Egg Producers guidelines) (Fraser 2006). They tend to be highly supported by industry groups, with
easily attainable standards, but since their primary goal is to educate producers, they have minimal enforcement or monitoring, and provide little assurance to consumers (Fraser 2006). Conversely, if producers obtain feedback, they might be highly motivated to make changes to improve animal welfare, particularly if their performance is compared to that of their peers (Main et al. 2003a). Additionally, while not legally enforceable, Canadian Codes of Practice for farm animals are sometimes referred to during animal cruelty investigations as examples of generally acceptable practices (Canadian Federation of Humane Societies 2016).

Legislative or regulatory welfare assurance programs, which are most evident in Europe, tend to be poorly received by industry as they are considered to be an unnecessary government interference, even though standards are often set quite low (Fraser 2006, Mench 2008). They are also difficult to implement, since they require the infrastructure necessary to enforce regulations through audits and inspections (Fraser 2006). In a general sense, legislation typically prescribes the resources that should be provided to animals, and therefore makes use of resource-based measures that are easily assessable through check lists (Main et al. 2003a).

International trade agreements are equally difficult to develop and maintain, as they require all participants parties to come to a consensus regarding acceptable standards; successful examples of international trade agreements that promote animal welfare include the European Union Council Directives banning battery cages for hens or stalls for sows (Fraser 2006). As trade agreements are largely political decisions, they are often made without industry consultation, and agricultural industries consequently tend to be resistant (Fraser 2006).

Primarily in response to consumer demand for welfare-friendly products, companies can also create their own assessment programs and require that producers conform to their standards (Fraser 2006); thus, there is an economic incentive to participate (Mench 2008). For instance,
McDonald’s and Burger King require that their egg producers maintain a certain cage size for their laying hens and that their slaughter plants pass a voluntary audit conducted by the American Meat Institute (Barnett & Hemsworth 2009, Fraser 2006, Mench 2008). Other companies or stakeholder groups have indirectly incorporated animal welfare standards into their quality assurance programs (Barnett & Hemsworth 2009). Since corporations can choose to simply not purchase from producers that do not comply with their standards, these programs are relatively straightforward to implement (Fraser 2006).

Finally, voluntary certification programs that reward successful participants by permitting the use of labels that differentiate their products (e.g. Certified Humane Raised and Handled®, American Humane Certified™, Animal Welfare Approved®) are becoming increasingly popular, especially since the products tend to be sold at a premium price, albeit usually in a niche market (Fraser 2006). Participating farms are usually subject to regular on-site audits by inspectors, which require a high degree of infrastructure, but also permits a high degree of consumer assurance (Fraser 2006). Although they do not ensure animal welfare for entire industries, they do provide consumers with choices (Fraser 2006).

Welfare assessment schemes can also be used as a research tool to enable decisions regarding legislation, or to verify that guidelines and certification schemes reflect a measurable improvement in welfare (Main et al 2003a). Assessments for research purposes tend to use mostly animal-based measures, and often include measures that are impractical for on-site assessment as they require too much time, equipment or assessor expertise (Blokhuis et al 2010, Main et al 2003a). Main and colleagues (2003b) used a research tool incorporating animal-based measures to compare the welfare of dairy cattle on Freedom Food and non-Freedom Food certified farms, with the hypothesis that welfare should be higher on certified farms if the
assessment scheme is valid; the Royal Society for the Prevention of Cruelty to Animals (RSPCA) developed the Freedom Food assessment scheme, which incorporates resource- and management-based measures (Main et al 2003b, Botreau et al 2007a). Results were mixed, with Freedom Food farms showing higher welfare for 12 indicators (e.g. mastitis, cleanliness, body condition), but poorer welfare for 8 indicators (e.g. hock injuries, lameness). Similarly, Mollenhorst and colleagues (2005) noted that laying hen welfare assessments conducted with the Animal Needs Index (ANI-200), a primarily resource-based assessment, correlated positively with behavioural observations for comfort and movement, but correlated negatively with wing damage from feather condition scores. These and other results have lead some scientists (e.g. Barnett & Hemsworth 2009) to argue that there is limited evidence that on-site welfare assessments actually improve animal welfare, particularly when assessments measure welfare in terms of inputs (i.e. resource- and management-based) rather than outputs (i.e. animal-based measures).

Standards

Welfare assessment programs outline standards for the care of animals, which set expectations that must be met in order to ensure good welfare. In some shape or form, the Five Freedoms are the basis for the standards included in most animal welfare assessment schemes. The Five Freedoms include the following: i) freedom from hunger and thirst, ii) freedom from discomfort, iii) freedom from pain, injury and disease, iv) freedom to express normal behaviour and v) freedom from fear and distress (Farm Animal Welfare Council 1979). Although standards should encourage producers to operate above minimum practices, they should also be achievable to the majority of producers to avoid discouraging participation (Main et al 2001); in other
words, standards should be a balance of ambitious and attainable. In addition, standards should be definable, auditable and enforceable (Main et al 2001).

In some instances, animal welfare science does not provide clear evidence to act as a foundation for standards due to issues such as differences in opinion, conflicting research results, or difficulties in establishing cut-off points (Barnett & Hemsworth 2009). Moreover, differences in stakeholders’ priorities can produce very different welfare assessments, even when based on the same research results, due to differences in the weighting of different categories based on perceived importance (Barnett & Hemsworth 2009).

**Aggregating measures into an overall score**

As a whole, the content of welfare assessment schemes should be exhaustive, such that all aspects of welfare are covered, yet also minimal, such that measures are not redundant and each complements the others with minimal overlap (Botreau et al 2007b, Rousing et al 2001). Criteria evaluated during welfare assessments should be independent, thus not requiring each other for proper interpretation, limited in number so as to remain ‘legible’, and generally agreed upon by all stakeholders, including being transparent and easy to understand for all involved (Botreau et al 2007b). In general, three main methods tend to be used to aggregate scores for a final overall welfare assessment. Firstly, assessment schemes can outline minimum standards, based on minimum thresholds for each measure, which must be met in order to pass the assessment and/or be considered part of the program; in other words, the outcome is binary with the participant receiving either a pass or a fail (Boteau et al 2007a). The RSPCA Freedom Foods scheme follows this model for overall welfare assessment (Boteau et al 2007a). Secondly, final assessment can be based on rankings, or the sum or mean of rankings for each section, which
allows producers to compare their performance to that of their peers (Boteau et al 2007a). For example, the Bristol Welfare Assurance Programme originally aimed to use quintiles to assign scores for overall welfare assessment (Boteau et al 2007a). Thirdly, scores for various measures and sections can simply be summed or averaged together, either in an unweighted or a weighted fashion, to produce an overall score, thus allowing for compensation for weaknesses (Boteau et al 2007a); this is the method used by the Animal Needs Index, ANI-35L, an Austrian welfare assessment scheme for farm animals. Although less common, some assessment schemes might not have a formal system of aggregating scores for each measure or section, and the final outcome score is based on assessor opinion following the on-site visit (Boteau et al 2007a).

Development of a welfare assessment scheme

When building a welfare assessment scheme, a ‘bottom up’ approach is helpful in deciding which elements should be included (Rousing et al 2001). Using this approach, each measure of animal welfare is individually assessed for its validity in terms of assessing welfare, the reliability of measurement between and within assessors and over multiple visits, and the practicality for use during an on-site visit (Rousing et al 2001).

It is also important to consider the opinions, interests, demands and concerns of all stakeholders, including but not limited to producers, retailers, consumers, and animal welfare scientists (Blokhuis et al 2003). This can, and has been done, in a number of ways. The Bristol Animal Welfare Assurance Protocol for cattle, pigs, and laying hens, was developed to enable the addition of animal-based measures (e.g. cleanliness, body condition, lesions, flight distance) into existing assessment schemes in the United Kingdom (Main et al 2007). Although each measure was later scientifically tested for inter-observer reliability, appropriate animal-based
measures and ‘intervention guidelines’ (i.e. minimum acceptable standards) were initially set based on results of formal expert consultations via a multi-stage survey approach (Main et al 2007, Whay et al 2003).

Welfare Quality® was a large-scale collaborative animal welfare project focused on the development of science-based on-site welfare assessments for cattle, swine and poultry, focused primarily on the use of animal-based measures (Blokhuis et al 2010). Initially, principles (i.e. good feeding, good housing, good health, appropriate behaviour) and criteria (e.g. absence of hunger and thirst, ease of movement, absence of injuries, expression of social behaviours) for welfare assessment were determined by scientific committees (Blokhuis et al 2010). These principles and criteria were then discussed during focus groups with members of the public in seven European countries and during interviews with retailers, producers, and certifying bodies in six European countries (Blokhuis et al 2010); other stakeholders and external scientists (i.e. scientists not involved on the initial scientific committees) were also consulted at this stage (Blokhuis et al 2010). This feedback led to the development of a draft assessment scheme, which was then piloted on a number of farms, with more discussion and feedback from citizens and farmers (Blokhuis et al 2010). The development process for Welfare Quality® has therefore involved many iterations of consultation with various stakeholders, and has been quite transparent (Botreau et al 2009). Moreover, only highly reliable measures were retained, allowing for standardization across assessors (Blokhuis et al 2010).

Examples of existing welfare assessment schemes

In line with an increasing interest in animal welfare, animal welfare assessment schemes have been developed or are in development for many species. On-site welfare assessment for
Agricultural animals (i.e. cattle, poultry, swine) has received significant research attention, which has lead to a number of fully developed schemes that form the basis of formal assessment programs. Attempts to generate welfare assessment schemes for other species groups (e.g. laboratory animals, equines, kenneled dogs) have also been made; however, to date, these schemes have been used mostly for research purposes and have yet to be used formally in any other manner.

Agricultural animals

The Animal Needs Index (ANI-35L) is an Austrian on-farm animal welfare assessment scheme that evaluates cattle, poultry and swine welfare in five main areas (i.e. possibility of movement, social contact, flooring, climate, human contact) using mostly resource- and management-based measures (Bartussek 1999, Blokhuis et al 2003). Sections, each with minimum standards, are not equally weighted, but since scores for all sections are summed into a final score, high scores in certain sections can diminish the impact of deficiencies in other sections (Bartussek 1999, Bartussek 2001); consequently, unsatisfactory farms might be assigned a higher category due to the weighting and aggregation into a final score, and farms within the same category might have variability in their practices (Blokhuis et al 2003). In the years since its development, the ANI-35L has acted as the basis of welfare legislation in Austria, as a tool to evaluate organic farming, and used by a private company to assign “animal protection proved” labels to agricultural products (Bartussek 2001). The German ANI-200 assessment scheme follows a similar format as the ANI-35L, but with somewhat different content (Bartussek 1999, Barussek 2001).
Welfare Quality® encompasses protocols developed for the on-farm assessment of cattle, poultry and swine welfare, and is the product of a large-scale collaboration between scientists from more than 40 institutions (Blokhuis et al 2010). Development of these protocols was driven by consumer demand, producer desire for objective welfare assessment, and European Union Directives for legislative control (Blokhuis et al 2010). In contrast to the ANI-35L scheme, Welfare Quality® focuses on science-based assessment via outcome (animal-based) measures, but has included some resource- and management-based measures in instances when animal-based measures have low reliability or sensitivity (Blokhuis et al 2010). During its development, different means of aggregating scores into an overall assessment were investigated to mathematically evaluate the impact on the outcomes (Botreau et al 2009). The final selected scoring aggregation formula requires that at least two out of four criteria score at the labelled level, with the other two scoring at least one category lower; for example, in order to be considered excellent, the farm must score excellent for at least two criteria, and score at least enhanced for the other two criteria (Botreau et al 2009). As a whole, the Welfare Quality® protocols are adaptable to each of the applications discussed above. For instance, the excellent category can be used to identify welfare-friendly products for niche markets and voluntary certification schemes, while the acceptable category can be used to identify farms complying with minimum acceptable standards for regulations or compulsory labels (Botreau et al 2009). They can also be used for self-assessment and producer education to encourage improvement, or as a research tool (Botreau et al 2009). Although the whole assessment requires between four and eight hours to complete, Welfare Quality® has the advantage of being a comprehensive, science-based assessment using animal-based measures, with validated standards that can be easily integrated into other assessment schemes (Blokhuis et al 2010).
Other species

Based on results from expert consultation, researchers in the United Kingdom developed a welfare assessment protocol for the evaluation of laboratory mouse welfare (Leach et al 2008). This tool largely evaluates husbandry and housing through resource-based (e.g. cage specifications, cage resources) and animal-based measures (e.g. physical appearance, behaviour) (Leach and Main 2008). To date, this tool appears to have only been used for research purposes (e.g. Leach and Main 2008). Spangenberg and Keeling (2016) have also developed a laboratory mouse welfare assessment scheme for the purpose of benchmarking, incorporating only animal-based measures that can be conducted in the mouse’s home cage. Measures were selected for inclusion based on published literature, feasibility for use during on-site evaluation in the animal’s home cage, and established validity (Spangenberg & Keeling 2016). Overall, this scheme is modeled after the 12 criteria used in the Welfare Quality® protocols (Spangenberg & Keeling 2016).

Efforts have also been made to develop welfare assessment schemes for working equines. Pritchard and colleagues (2005) developed a protocol to assess the welfare of working horses, mules and donkeys using only animal-based measures (e.g. response to human approach, wounds, lameness, body condition), with the main goal of benchmarking. Initial lists of potential parameters were developed based on expert consultation and published literature, and a draft assessment tool was tested for feasibility in the field (Pritchard et al 2005). Inter- and intra-observer reliability of ratings was later evaluated (Burn et al 2009). Ali and colleagues (2016) incorporated this welfare assessment tool and other published indicators into their own welfare assessment scheme in order to investigate the most prominent welfare issues according to species (i.e. horse, donkey, mule) and type of work (i.e. transport of goods, transport of people, being
ridden, working in brick kilns) on a larger population of working equines in Egypt. Overall, these schemes have thus been used mainly as research tools.

In terms of assessing the welfare of companion animals, Kiddie and Collins (2014) developed a quality of life assessment tool for kenneled dogs kept in shelters. This scheme incorporates only animal-based measures, and focuses largely on unprovoked behaviour (e.g. pacing, tail chasing, panting, grooming, time at front of kennel, play with other dog) and behaviour during human approach and interaction (e.g. aggression, tail wagging, playing), but also includes body condition, skin flakes and eye discharge (Kiddie & Collins 2014). Measures were evaluated for internal consistency and inter-observer reliability, and the draft tool was evaluated on over 200 dogs in 13 shelters to evaluate validity (Kiddie & Collins 2014). To date, this tool has been used for research purposes, but has the potential to be used by shelter staff for self-assessment and decision-making (Kiddie & Collins 2014).

**Existing assessment programs for companion animal veterinary clinics**

In Canada and the United States, each provincial or state veterinary regulatory body sets their own standards and policies for veterinarian licensing and veterinary facility accreditation in their jurisdiction. Uniform regulations for licensing and accreditation do not exist at the national level in Canada or the United States. In Ontario, the site of the current research, the College of Veterinarians of Ontario (CVO) is the regulatory body and has established a quality assurance program that involves accreditation inspections against minimum standards for veterinary facilities (College of Veterinarians of Ontario 2009). This is a proactive measure in that inspections are performed at five-year intervals in order to maintain accreditation and after ownership changes rather than in response to complaints (College of Veterinarians of Ontario...
The main goal of accreditation inspections is to ensure compliance with legislation, in which minimum standards are largely related to the contents of the facility (e.g. examination rooms, operating room, pharmacy, and laboratory, diagnostic and anesthetic equipment) (College of Veterinarians of Ontario 2010). The CVO has additional voluntary programs, such as peer review of veterinary records, and provides guidelines and position statements that it encourages its members to follow (College of Veterinarians of Ontario 2009). Some of these position statements are on welfare-related topics, and although they may be referenced in situations such as complaints, they are not enforceable. As such, there is currently not a program though which patient welfare is assessed nor legislated in Canadian and American veterinary clinics.

The American Animal Hospital Association (AAHA) has developed a voluntary accreditation program (AAHA Accredited®) to recognize veterinary clinics that comply with established veterinary care standards. The American Association of Feline Practitioners (AAFP) has also created a voluntary program focused on feline-specific needs: the Cat Friendly Practice® program. Both of these programs operate under a voluntary certification for consumer assurance model, whereby veterinary clinics are motivated to participate by the ability to use the programs’ labels to set themselves apart from other clinics and potentially garner an increased client base. The AAHA Standards of Accreditation, based on expert opinion, include both mandatory and recommended standards for topics such as quality of care, management, medical records, facilities, and diagnostics and pharmacy (American Animal Hospital Association 2011). While this program does not focus on ensuring animal welfare, a few sections encourage practices that might improve patient welfare. For instance, AAHA accreditation encourages routine pain assessment through objective means, individualized and pre-emptive pain management for all surgical patients, having written protocols for patient handling, and counseling pet owners on pet
behaviour (American Animal Hospital Association 2011, Epstein et al 2015, Hammerle et al 2015); these standards are largely assessed through management-based measures, such as investigation of patient records, protocol books and educational materials, and via an on-site evaluation by an AAHA assessor (American Animal Hospital Association 2011). A portion of the Cat Friendly Practice® program focuses on reducing feline stress, and as such, does include specific measures aimed at improving feline patient welfare. For example, the program encourages species separation in waiting rooms, the provision of hiding places in cages in the hospitalization area, and the use of low-stress handling techniques (Rodan et al 2011).

Assessment for the Cat Friendly Practice® program is entirely self-driven: veterinary clinics wishing to participate complete a checklist on their own time and submit photos for approval, but are neither subject to a site visit nor an evaluation by a third party (American Association of Feline Practitioners 2016). Although these two programs might indirectly promote patient welfare in certain areas of veterinary care, programs for the overall assessment of canine and feline welfare assessment have to date not been developed for use in veterinary clinics.

Animal welfare in the veterinary clinic

In the veterinary clinic setting, animals are subjected to a number of events (e.g. interacting with new people, encountering other animals, experiencing surgery) that can impact their welfare. The veterinary clinic setting can thus cause animals to experience fear, stress and pain, all of which are negative affective states.
Fear and stress

In the scientific literature, the terms fear and stress are often used interchangeably when referring to similar phenomena. For the purposes of this review, it is thus important to define this terminology.

Fear is a direct response to a perceived or actual threat or danger (Duncan 1993, Boissy 1995). As a negative affective state, any situation causing fear potentially compromises animal welfare. Animals do not have the ability to self-report their affective states, so the assessment of fear is not possible via direct methods; it is dependent upon proxy measures, such as behaviour or physiology (Paul et al 2005). Animal behaviours indicative of fear range widely, and can include defensive behaviours (e.g. ‘fight’, attack), avoidance behaviours (e.g. ‘flight’, hiding, escape) and immobility responses (e.g. freezing) (Boissy 1995).

Although there is no generally agreed upon definition, stress is generally characterized by the non-specific activation of bodily resources in response to any challenge to homeostasis (Fraser 2008b, Paul et al 2005). The study of stress in animals typically investigates reactions to aversive situations, such as a potential or real perceived threat or danger (e.g. predation, injury, cold), which often in turn trigger a negative affective state (e.g. fear, pain) (Fraser 2008b, Paul et al 2005). The stress response tends to be measured via physiological means, such as the hypothalamic-pituitary-adrenal (HPA) (e.g. glucocorticoid concentrations) and sympathetic-adrenal medulla (SAM) system activation, and changes to autonomic functioning (e.g. heart and respiratory rate, blood pressure) (Fraser 2008b, Paul et al 2005). These physiological measures are generalized responses and not indicators of a specific affective state, but provide some evidence of affect, particularly if there are other reasons (e.g. behaviour) to believe that affect is present (Fraser 2008b).
Because physiological stress responses are often used to assess affective states like fear, there is considerable overlap between the study of fear and stress in animals, and this can sometimes even lead to the interchangeable use of the terms by animal welfare scientists (Paul et al 2005). For instance, Kessler and Turner (1997) developed a scale they termed a ‘cat stress score’, which assesses feline stress using elements of body language (e.g. body, tail, head, ear, and whisker position) and behaviour (e.g. vocalization, general activity level). However, as McMillan (2012) has discussed, the three highest scoring categories are labelled “fearful”, “very fearful”, and “terrorized”, suggesting that the authors were using the terms ‘stress’ and ‘fear’ interchangeably, and that the tool might be more appropriately labelled a ‘cat fear score’. Others (Fraser 2008b) have also criticized the ‘cat stress score’, noting that it is a measure of adaption to a new environment, rather than a categorization of a general response to stressors. In a general sense, physiological stress responses are non-specific, while behaviour indicative of affective state might be more specific to the stressor (Veissier & Boissy 2007). For the purposes of this review, I have defined fear as the underlying affective state (i.e. feelings), while stress is the physiological response exhibited by the animal in response to the event that is causing the affective state. As such, some studies that authors have labelled as investigations of fear or stress have been relabelled here.

Visiting a veterinary clinic involves many unfamiliar situations: an unfamiliar environment with unfamiliar animals and people, including staff members who are manipulating and touching the animal in unfamiliar ways (e.g. with the dog standing on a table). Hospitalized patients are separated from their owners, and might be left in the veterinary clinic for extended periods of time during recovery. Since each negative experience has the potential to condition animals, previous experiences at the veterinary clinic can also produce a conditioned avoidance

Numerous studies have investigated the prevalence of fear and stress in canine veterinary patients. A study of 462 canine patients visiting a veterinary clinic for routine examinations noted that 70% of dogs were unwilling to enter the veterinary clinic, and 60% of dogs displayed a submissive posture (e.g. tucked tail, lowered head, avoidance of eye contact), and froze and/or attempted to escape when placed on the examination table (Stanford 1981). During a three-minute observation period while in the waiting room with their owners, 82% of dogs nose licked, 56% panted, 44% held their ears in a lowered position, and 36% yawned (Mariti et al 2015). Each of these behaviours are thought to be indicative of an animal in ‘acute stress’ according to Beerda and colleagues (1997, 1998, 1999); however, based on the definitions outlined above, these behaviours would also be indicative of a fearful animal. Moreover, 53% of all dogs showed four or more different behavioural indicators of fear during the observation period (Mariti et al 2015). Döring and colleagues (2009) noted similar levels of patient fear when evaluating the behaviour of 135 canine patients (various breeds, ages, genders) at various time points during a standard veterinary visit. When entering the examination room, 36% of dogs were hesitant or hid, and 56% panted while in the room itself (Döring et al 2009). While on the examination table, 61% trembled, 71% exhibited avoidance behaviour, 78% crouched and 75% had a lowered or tucked tail; the incidence of these behaviours was significantly lower on the floor compared to on the table itself (Döring et al 2009). Finally, 84% of dogs pulled to exit the room once the examination was complete (Döring et al 2009). On the basis of exhibiting at least three behavioural signs of fear, 78% of all dogs were categorized as fearful (Döring et al 2009).
Results from another study investigating the responses of healthy dogs to standard head-to-tail examinations found the incidence of fear among canine patients to be much lower: Glardon and colleagues (2010) noted that only 37% of healthy dogs were fearful, “reserved” or “agitated” based on their behavioural responses. This study did not provide many details regarding the specific behaviours that were used to label patients, and lower than expected levels of fear might be due to the methodology used to categorize patients; for instance, the authors might have only considered obvious signs of fear, such as aggression or attempts to escape. Nonetheless, while fear tends to be higher amongst middle-aged and older patients, puppies also routinely display signs of fear during veterinary visits (Döring et al 2009, Godbout et al 2007). When undergoing a physical examination on an examination table, 62% of puppies between eight and 16 weeks of age lip licked and 19% of puppies yawned at least once during their visit (Godbout et al 2007).

Fewer studies have focused on fear and stress in feline patients. During standard head-to-tail physical examinations, 16 out of 100 healthy cats exhibited behaviours indicative of fear (Glardon et al 2010). Again, few details were provided regarding the criteria used to categorize cats as fearful and, although based on a sample of only 21 cats, results from a study conducted by Toner (unpublished MSc. paper, 2012) contradict these results: they concluded that 95% of cats were fearful during at least some portion of the physical examination, based on the display of at least two behavioural indicators of fear (e.g. crouched body position, flattened ear position, tucked head or tail position, backing away, swatting). Compared to a physical examination using identical techniques in the home environment, cats examined at a veterinary clinic showed higher blood glucose levels and a greater incidence of hiding behaviours, both of which are associated with increased fear and stress (Nibblett et al 2015).
Fear and stress are not limited to outpatients, and are also demonstrated by patients during the preoperative period. Väisänen and colleagues (2005) observed the behaviour and cardiac activity of 41 healthy female dogs of various breeds while they were left in their cages prior to routine ovariohysterectomy. Over the half hour period, during which they were left undisturbed, 80% of dogs displayed panting or displacement behaviours (e.g. yawning), both of which are indicators of fear (Väisänen et al 2005). Additionally, 40% of dogs did not show any decrease in heart rate over the monitoring period, suggesting that they never became fully acclimatized to the environment (Väisänen et al 2005). Hekman and colleagues (2012) monitored the behaviour and salivary cortisol levels of canine patients placed in a hospital ward while awaiting elective surgical procedures. Out of the 28 dogs studied, 21 (75%) panted and 22 (79%) lip licked, with both behaviours positively correlated to salivary cortisol concentrations (Hekman et al 2012). Each of these studies suggest that canine veterinary patients experience some form of emotional arousal, stress, or fear in the veterinary clinic, both while in the waiting room and during the preoperative period.

In the veterinary clinic setting, fear is a common contributor to patient aggression towards veterinary staff (Moffat 2008). Fear can initially be categorized by attempts to escape or freezing, but if these are unproductive and fleeing the situation is impossible, the animal might eventually resort to defensive aggression, particularly if the veterinary staff member does not react appropriately to the animal’s behavioural signals (the ‘fight or flight’ response) (Moffat 2008). As a negative affective state, fear is a concern in its own right; however, once fear turns to aggression, it can also compromise staff safety and increase the risk of animal injury. Roughly 75% and 80% of veterinarians have been bitten by a dog or cat, and veterinary staff members are 3.9 times more likely to get bit when a cat or dog is ‘difficult to handle’ (Drobatz and Smith
Of a sample of 462 healthy canine patients, 18% were labeled as ‘fear-biters’ that attempted to snap at their examiners (Stanford 1981). Glardon and colleagues (2010) noted a comparable incidence of aggression when investigating patient reactions to standard physical examinations: 16% of dogs and 13% of cats were categorized as aggressive or dangerous. Moreover, due to patient behaviour, complete physical examinations were not possible for 30% of dogs and 24% of cats (Glardon et al 2010). Reducing patient fear and anxiety has the potential to reduce the risk of injury to veterinary staff members (Herron & Shreyer 2014). Beyond the risks this poses to staff and animal safety, the inability to complete a full physical examination has negative implications for the early diagnosis and treatment of health concerns.

Besides the negative effect on the animal itself, the stress response also impacts the ability to collect accurate medical information, thus limiting veterinarians’ abilities to properly evaluate and diagnose medical conditions. The blood pressure and heart rate of 13 research colony cats, as measured via radiotelemetric implants, were significantly higher during a simulated office visit with an ‘owner’ (familiar caretaker) and an unfamiliar technician and veterinarian than the average taken over a 24-hour period in the cats’ usual home environment (Belew et al 1999). Although this effect decreased as the simulated appointment progressed, it never fully disappeared (Belew et al 1999). Belew and colleagues (1999) thus concluded that there is evidence for a ‘white coat effect’ in feline patients, similar to in human medicine, and that allowing the patient time to acclimate to the environment and veterinary staff members could potentially lead to more accurate measurements. Similarly, Quimby and colleagues (2011) noted that the blood pressure, heart rate and respiratory rate of 30 healthy client-owned cats were significantly higher in the clinic setting compared to in the animal’s home. Moreover, the quality of blood samples collected from stressed animals has also been shown to be reduced, with
detrimental effects on blood coagulation, complete blood count results, and glucose concentrations (Gilor and Gilor 2011, Lippi et al 2005, Overall and Mills 2012). With less precise physiological parameters and medical results, the ability to detect changes in health status might be compromised. This can further compromise patient welfare if disease is left undetected and untreated. Moreover, fear and stress might increase animal sensitivity to pain; the release of serotonin acts on neurons to increase nociception, leading to hyperalgesia (Epstein et al 2015, Hansen 2000). Conversely, other studies have found evidence for stress-induced analgesia in rodents and humans, so stress might also have a similar analgesic effect in dogs and cats (Butler & Finn 2009). Human medical literature suggests that stress can also negatively impact postoperative healing; postoperative patients who are not fearful or stressed have fewer infections, quicker recovery times, and fewer postoperative visits (Roddenberry & Renk 2010). The reduction of fear and stress is, thus, especially important for surgical patients.

**Pain**

Pain can be divided into three components: 1) nociception, whereby noxious stimuli is detected by receptors that then transmit a signal to the brain; 2) the perception of the signal in the brain and subsequent unpleasant sensory and emotional experience; 3) the changes in behaviour that result from this nociception and unpleasant experience (Epstein et al 2015, Robertson 2002). Pain functions to force an animal to minimize or avoid exposure to present and future situations that might cause bodily harm, and to facilitate the recovery from any damage or injuries incurred through exposure to these harmful or dangerous situations (Bateson 1991, Mathews et al 2014). It is now widely accepted that all mammals have the ability to experience pain. These species have similar anatomical and physiological systems for detection and processing of pain in
comparison to humans (e.g. receptors, nervous pathways, brain structures) (Bateson 1991). They have been shown to avoid returning to situations that might be painful, and they will also work to avoid these situations (Bateson 1991). Furthermore, pain responses are reduced following administration of appropriate analgesics (Bateson 1991, Broom 1991). The experience of being in pain is a subjective, individual experience, so the existence of pain in animals relies on assessment via indirect correlates (Bateson 1991, Broom 1991).

Acute pain is usually associated with tissue damage, which can be induced by injury or surgery, and is of a predictable duration given the process of inflammation and healing (Epstein et al 2015, Mathews et al 2014, Robertson 2002). Veterinarians have a professional and ethical obligation to treat animal pain, especially that induced by their own surgical interventions (Epstein et al 2015, Robertson 2002). Surgical procedures, by virtue of causing tissue damage and inflammation, are known to cause varying levels of pain (Epstein et al 2015, Robertson 2002). Methods involved in diagnosis or treatment of diseases or injuries can also cause veterinary patients pain, particularly if they involve invasive procedures or heavy restraint (Hansen 2000). It is difficult to quantify the number of animals who have experienced acute pain during veterinary care. Given many cats and dogs in North America undergoing routine elective ovariohysterectomies and castrations, it is safe to assume that millions have experienced some level of surgically induced acute pain at least once in their lifetime. Hewson and colleagues (2006a) attempted to quantify the number of animals affected by a lack of perioperative analgesic use in Canada. From their estimates, given that there are roughly 6200 Canadian veterinarians who work in small or mixed animal practice, with roughly 86% performing canine ovariohysterectomies, and each performing approximately 14 ovariohysterectomies per month, 74,648 dogs undergo ovariohysterectomies per month in Canada alone, each of which might
experience pain if perioperative analgesic regimes are not optimized (Hewson 2006a). Given the number of cats and dogs affected by surgical procedures, including those that are non-elective in nature, acute pain induced by surgery is a serious veterinary-care related welfare concern.

A number of behaviours can be used as indicators of acute pain in cats and dogs, including the following: facial expressions (e.g. squinting, dilated pupils, furrowed brow) (Lamont 2002, Mathews 2000, Mathews et al 2014, Robertson 2008), lowered head and/or tail (Mathews 2000, Mathews et al 2014, Robertson 2008), abnormal or hunched postures (Lascelles & Waterman 1997, Mathews 2000, Mathews et al 2014, Robertson 2008), reluctance to move or interact (e.g. hiding, remaining in back of cage, distant) (Lamont 2002, Lascelles & Waterman 1997, Mathews 2000, Mathews et al 2014, Robertson 2008), restlessness and inability to settle (Mathews 2000), guarding and increased attention to the affected site (e.g. excessive grooming) (Lamont 2002, Mathews 2000, Mathews et al 2014, Robertson 2008), response to interaction and palpation (e.g. flinching, withdrawal, aggression) (Lascelles & Waterman 1997, Mathews et al 2014, Robertson 2008), and a general change in normal behaviours (e.g. before versus after surgery) (Lamont 2002, Mathews 2000, Mathews et al 2014, Robertson 2008). In research settings, these behavioural signs have been associated with pain, and are considered to be reliable indicators. For instance, dogs that underwent elective ovariohysterectomies had higher numeric pain scores (based on head and body position and movement, general attitude and reaction to palpation, and time spent standing, sleeping and in lateral recumbency) than dogs from a control group who were anaesthetized but did not undergo surgery (Hardie et al 1997a). A number of non-specific behavioural signs of pain overlap with behaviours that are also associated with anxiety and fear (e.g. vocalization, reduced appetite, panting, dilated pupils), which might make pain assessment difficult in a veterinary clinic setting (Mathews 2000).
Chronic pain is defined as ongoing pain that persists beyond the duration expected due to acute pain; it can have begun as acute pain, and might be due to degenerative or neoplastic processes, but can also have no apparent cause (Bell et al 2014, Epstein et al 2015, Robertson 2002). Much like acute pain, it is difficult to quantify the number of animals who suffer from chronic pain, particularly since it is often less predictable and more difficult to identify. A large scale study of over 600 cats and more than 1000 dogs visiting a university veterinary hospital revealed that 14% of cats and 20% of dogs were likely in pain, according to owners’ questionnaire responses (Muir III et al 2004). Veterinarians consider osteoarthritis, a form of degenerative disease, to be the most common source of canine chronic pain, affecting 20% of all dogs over the age of one year (Bell et al 2014; Johnston 1997). Radiographs can also reveal disease that is not detectable through history taking and examination alone, suggesting that chronic pain is often under-diagnosed. In a random sample of 100 client-owned cats of all ages, 92% of all cats exhibited some signs of degenerative joint disease according to radiographic evidence (Lascelles et al 2010). Moreover, in another study, while only 4% of cats aged 12 years or older were lame, radiographs revealed that 90% had some type of degenerative joint disease, including osteoarthritis (Hardie et al 1997b). A similar phenomenon appears to occur in dogs, with less than 5% of dogs with radiograph-diagnosed degenerative joint disease showing any clinical signs (Smith et al 2001). Even though radiographs suggest a high frequency of degenerative joint disease, it is uncertain whether dogs and cats with low severity disease experience pain, or if pain is mostly limited to advanced, higher severity disease. Cancer is another common source of chronic pain, with an estimated 30% of dogs and cats thought to be in pain at the time of diagnosis (Lascelles 2012). Other common sources of chronic pain include dental pain, aural pain and spinal pain (Bell et al 2014).
Basic behavioural signs of chronic pain include the loss of normal behaviours (e.g. reluctance to use stairs or jump up, reduced grooming), the development of new behaviours (e.g. inappropriate elimination due to changes in mobility, limping), and changes in the animal’s willingness to interact with owners and others pets in the household (e.g. withdrawal, distance) (Epstein et al 2015, Mathews et al 2014). Signs of chronic pain tend to be subtle and can develop slowly over time, so veterinarians should include owners in diagnosis (Mathews et al 2014).

Beyond being a state of suffering, pain can have other adverse effects on animal health and welfare (Robertson 2002). Pain can negatively impair and extend post-surgical recovery (Lascelles & Waterman 1997, Mathews 2000, Robertson 2002), increase the risk of complications (Lascelles & Waterman 1997, Mathews 2000), and extend the length of the hospital stay (Mathews 2000). Animals in pain often experience a loss of appetite (Lascelles & Waterman 1997, Mathews 2000), weight loss (Robertson 2002), muscle atrophy (Robertson 2002), elevated blood pressure (Robertson 2002), immune system suppression (Mathews 2000), and reduced respiratory system functioning (Lascelles & Waterman 1997), including an increased risk of collapsed lungs and developing pneumonia, particularly for cats (Robertson 2002). Animals in pain are also more likely to self-mutilate, particularly at the affected site, further extending the time required for recovery (Lascelles & Waterman 1997, Mathews 2000, Robertson 2002).

**Aspects of veterinary care that impact animal welfare**

*Pain management*

Effective pain management necessitates the ability to assess pain in a true and exact manner (Robertson 2002). If veterinary staff members are unable to identify animal pain, it is a
significant obstacle to appropriate pain treatment (Hansen 2000). Since animals do not have the ability to verbalize their subjective experience, identification depends entirely on a third party; this third party is often a veterinarian or technician. Objective physiological measures, such as heart rate, blood pressure and body temperature, have often been used to identify pain in animals; however, research has proven that these are neither specific nor accurate enough to be used independently as measures of animal pain (Epstein et al 2015, Robertson 2002). For instance, in a study of 18 client-owned cats undergoing deep digital flexor tenectomies or onychectomies, there was no significant difference in the heart rate, respiratory rate, rectal temperatures, or concentrations of plasma endorphins and cortisol between the experimental groups (i.e. tenectomy or onychectomy) and the control group (i.e. anaesthetized, prepped for surgery and bandaged, but no surgical treatment) suggesting that these measures are not valid indicators of pain in cats (Cambridge et al 2000). Hansen and colleagues (1997) had previously reached a similar conclusion in a study of 39 dogs undergoing ovariohysterectomy: physiological measures, such as respiratory rate, blood pressure and rectal temperature, did not consistently permit the differentiation of dogs who underwent routine ovariohysterectomies from the control group of dogs who were simply anesthetized. As such, an increasing number of studies comparing various surgical techniques and analgesic regimes have incorporated patient behaviour into assessments of animal pain (e.g. Al-Gizawiy et al 2004, Ingwersen et al 2012, Robertson 2002, Siracusa et al 2008). Regardless, the identification of pain in animals is not straightforward, with 33% of veterinary practitioners, 54% of anesthetists and 57% of oncologists working in the United Kingdom citing difficulties in identifying pain as a major barrier to treatment (Bell et al 2014).
Nonetheless, a number of tools are available to aid veterinarians in the assessment of patient pain in veterinary practice. Simple descriptive scores (SDS), numerical rating scales (NRS), and visual analogue scales (VAS) are straightforward and frequently used for the assessment of acute pain, but are not without their limitations (Mathews 2000). For instance, SDS (e.g. none-mild-moderate-severe) and NRS (e.g. any integer between 0 and 10) are easy and simple to use, but might not be sensitive given the limited number of levels, and VAS (e.g. placing a point along a line) are sensitive but require experience and training to retain consistency (Mathews 2000). These scales do not provide specific instructions of signs to look for, and so they rely entirely on each individual’s interpretation of pain, and often have high variability between observers (Mathews 2000). Moreover, these scales do not suggest the threshold or cut-point at which intervention is needed. More elaborate pain scales, which tend to incorporate behavioural signs of pain, have also been developed. Validated tools for the clinical identification of post-surgical feline and/or canine pain include the Glasgow Short Form Composite Measure Pain Score (Reid et al 2007) and the UNESP-Botucatu Multidimensional Composite Pain Scale (Brondani et al 2013); Colorado State University has also developed the CSU Canine and Feline Acute Pain Scales, but these have yet to be validated. Each of these acute pain scales relies in part or in full on animal behaviour to identify pain (Epstein et al 2015). A number of validated tools are also available for the recognition of chronic pain in companion animals, including but not limited to the Helsinki Chronic Pain Index (Hielm-Björkman et al 2009), the Canine Brief Pain Inventory (Brown et al 2007, Brown et al 2008), and the Feline Musculoskeletal Pain Index (Benito et al 2013). Owner questionnaires have also been developed and validated to aid veterinarians in the identification of chronic pain (e.g. Wiseman-Orr et al 2004). Chronic pain is often associated with subtle behaviour changes, so it is important that
veterinarians educate owners so that they are well versed in these signs (Wiseman-Orr et al 2004, Bell et al 2014). Veterinarians then can and should take advantage of owners’ observations of changes in behaviour to identify chronic pain. Klinck and colleagues (2012) noted that among 50 client-owned cats suspected to have osteoarthritis based on owner-reported behavioural changes, physical examination and/or radiographs and/or response to treatment confirmed osteoarthritis in 70% of these cases. Their results therefore support the suggestion that owner’s observation skills can aid in the diagnosis of chronic pain. Additionally, although less practical for use in veterinary practice, automated measures can also enable the detection of canine and feline pain. Examples include the use of force plates and video recording for gait analysis (e.g. Guillot et al 2013, Hudson et al 2004, Rialland et al 2012), the use of accelerometers to track activity (e.g. Guillot et al 2013), the use of automatic video tracking software to measure activity levels (e.g. Hansen 2003), and the use of mechanical devices designed to measure the force at a surgical site that induces flinching (e.g. Slingsby & Waterman-Pearson 2000).

According to the CVO’s position statement concerning pain management, Ontario veterinarians are obliged to prevent and treat pain in any patient (i.e. surgical or medical) in which the potential for pain exists (College of Veterinarians of Ontario 2013). Beyond a professional and ethical obligation to control pain and reduce suffering, pet owners also have an expectation that their veterinarians effectively manage their pets’ pain. Demetriou and colleagues (2009) compared veterinary client expectations, as determined through a survey of pet owners, to actual veterinary practices, as determined through assessments by final year veterinary students on externships in veterinary practices across Great Britain. In terms of the provision of perioperative analgesics, 78% of clients expected routine provision of analgesics for all surgeries, and 63% of veterinary practices were actually meeting this expectation (Demetriou et
In terms of the post-discharge provision of analgesics, however, there was a larger mismatch between expectations and reality, with 61% of pet owners indicating they expect pain relief to be sent home with the pet, and 18% of veterinary practices actually doing this (Demetriou et al 2009). Moreover, in a conjoint survey-based study, pet owners consistently selected scenarios that included the provision of analgesics prior to, during and after ovariohysterectomies or castrations over scenarios that offered no pain relief (Lue et al 2008).

Overarching principles of veterinary pain management suggest the use of pre-emptive, multimodal analgesia, with provision on an individualized basis (Epstein et al 2015, Mathews et al 2014). Pre-emptive analgesia involves supplying analgesia prior to the commencement of surgery and the onset of any surgically induced pain, to prevent ‘wind up’ or central hypersensitivity (Hansen 2000, Lamont 2002, Lascelles & Waterman 1997, Mathews et al 2014). It relies on the principle that pain is more effectively controlled when prevented, rather than treated only once signs become apparent (Epstein et al 2015); in other words, it is better to prevent than to treat pain (Al-Gizawiy et al 2004, Lamont 2002). Multimodal pain management involves the use of two or more classes of drugs. It takes advantage of drugs’ additive effects to maximize the control of pain through lower dosages, thus minimizing adverse side effects (Mathews et al 2014, Robertson 2008). For example, opioids and non-steroidal anti-inflammatory drugs (NSAIDs) are a commonly employed in combination for surgical patients (Hunt et al 2015). Finally, to mirror the fact that the experience of pain is individualized, analgesic regimes should also be individualized (Hansen 2000, Hansen 2003). Even if exposed to similar stimuli (e.g. the same surgical procedure), some animals might experience different degrees of pain than others (Hansen 2003, Mathews 2000). When creating an analgesic plan, veterinarians should thus take animals’ personality, including pain tolerance, into account.
(Mathews 2000). Since there is no single reliable objective measure of animal pain, analgesics should be provided whenever there is a potential for pain; the detrimental effects of overtreatment are less than the distress of being in pain (Lamont 2002, Lascelles & Waterman 1997).

A number of factors influence analgesic use in a veterinary setting. Historically, analgesic use was reduced due to limited availability of approved drugs, especially for cats, and veterinarians’ perceptions that pain aids recovery by reducing activity, and this likely left many animals in post-surgical pain (Al-Gizawiy et al 2004). Non-steroidal anti-inflammatory drugs (NSAIDs) did not become widely accepted for use for companion animals in veterinary practice until the 1990s. In addition, recent research has permitted an increase in the use of opioids with fewer adverse effects (Lascelles et al 2007, Robertson 2008). Even though a painful animal is likely to move around less, veterinarians should never purposely withhold pain relief (Hansen 2000). This view of withholding pain relief is becoming increasingly rare: a survey of practicing veterinarians in New Zealand revealed that 77% of veterinarians disagree with the idea of leaving an animal in pain to keep it inactive and 86% agree that the benefits of analgesia outweigh the side effects (Williams et al 2005).

Because the identification of pain relies on proxy measures and their interpretation, veterinarians’ attitudes about pain also have the potential to impact their analgesic use. Multiple studies, conducted in North America, Europe and Australasia, have found that recent veterinary school graduates perceive a number of surgical procedures to be more painful than do earlier graduates, are more likely to provide analgesics to their painful patients, and have fewer concerns over potential adverse effects of analgesic drugs (Bell et al 2014, Capner et al 1999, Dohoo & Dohoo 1996b, Hewson et al 2006b, Hunt et al 2015, Lascelles et al 1999, Raekallio et al 2003, Williams et al 2005). Female veterinarians follow a similar trend, assigning higher
perceived pain scores to surgical procedures and prescribing more analgesia to their canine and feline patients than their male colleagues (Capner et al 1999, Dohoo & Dohoo 1996b, Hugonnard et al 2004, Hunt et al 2015, Lascelles et al 1999, Raekallio et al 2003, Williams et al 2005). Moreover, for the same surgical procedure, veterinarians often rank the pain experienced by dogs as higher than that experienced by cats (Dohoo & Dohoo 1996a, Hewson et al 2006a, Hunt et al 2015). Working with an animal health technician increases the chances of a veterinarian ranking any given surgical procedure as painful, perhaps because technicians monitor patients and alert veterinarians when patients might be in pain, so their presence can increase awareness among veterinarians (Dohoo & Dohoo 1996b, Hewson et al 2006b).

On a positive note, changes in attitudes towards animal pain and analgesics used to treat this pain have shown the potential to change quickly over time. Two studies of Canadian veterinarians, conducted seven years apart using the same methodology, showed that veterinarians in the later study considered ovariohysterectomies to be more painful in dogs and cats, and prescribed three times more analgesics post-surgically than in the previous study seven years prior (Hewson et al 2006a). Similarly, surveys of United Kingdom veterinarians revealed an increase in the use of perioperative and postoperative analgesics for dogs and cats from 1996 to 2013 (Hunt et al 2015).

Because of issues related to attitudes towards pain, and their impact on the prescription of analgesics, experts recommend the use of pain scoring tools to identify both acute and chronic pain in veterinary patients, as they increase objectivity (Epstein et al 2015, Hunt et al 2015, Reid et al 2013). In fact, Hewson et al (2006b) have noted that if veterinarians had a valid, reliable means through which to recognize pain, analgesic use would likely increase. Despite this, studies
have revealed that veterinarians use pain scales at very low levels, and that neither gender nor time since graduation influences the likelihood of their use (Hunt et al 2015).

A lack of knowledge, or confidence in one’s knowledge and ability to recognize and treat patient pain, can also limit analgesic use. Veterinarians often note that their veterinary education did not adequately prepare them for the challenges of recognizing and treating patient pain in veterinary practice. Through surveys, 74% of French veterinarians revealed that they did not believe veterinary school provided sufficient training to properly assess and manage pain (Hugonnard et al 2004). Similarly, results of a questionnaire provided to practicing veterinarians in New Zealand revealed that 42% of veterinarians considered their knowledge of pain assessment and treatment to be inadequate, with 28% believing that veterinary school was the least useful source of information regarding pain management (Williams et al 2005). In a survey of Canadian veterinarians conducted 20 years ago regarding postoperative analgesic use in companion animals, 77% of veterinarians considered their knowledge of pain recognition and treatment to be inadequate, with veterinary training considered the least important source of information, and experience in practice being the most important source (Dohoo & Dohoo 1996a). A more recent version of this same study noted that a smaller proportion (51%) of Canadian veterinarians consider their knowledge inadequate, suggesting that veterinarians feel more confident in their abilities to identify and control pain compared to only seven years prior (Hewson et al 2006a); this might be due to increased focus on pain in veterinary curriculums, or to more readily available continuing education opportunities, or both. In fact, one study found that having attended a continuing education event in the previous 12 months increased the chances of a veterinarian scoring a procedure as painful, although this same study also noted that continuing education attendance also increased the likelihood of having one or more major
concerns about postoperative analgesic use, which in turn led to decreased use (Dohoo & Dohoo 1996b). The follow-up study conducted by Hewson and colleagues (2006b) was unable to explore this link; however, one would expect the link between continuing education and having concerns about analgesic use to have decreased in the years since the initial study due to ongoing research into pain management and the development of more drugs.

In summary, as pain is an affective state, pain management necessitates that animal caretakers are able to recognize pain. Pain is most accurately assessed using animal behaviours, rather than physiological measures alone. A number of objective acute and chronic pain assessment tools have been developed for use in veterinary practice, and veterinarians should make use of these tools to ensure adequate pain control in all their patients. As a whole, overarching principles of pain management include pre-emptive and multimodal analgesia that is individualized to the patient. Veterinarian analgesic administration has been shown to be impacted by many factors, including: time since graduation, gender, species in question, attitudes towards pain, knowledge and ability to recognize pain, working with an animal health technician, and attendance at continuing education events. Overall, there have been documented changes over time in both attitudes towards pain and the use of analgesics over time.

*Veterinarian-client communication*

Veterinary care impacts animal welfare beyond the veterinary clinic doors. Veterinarians are in an excellent position to act as both a reliable advisor and educator concerning all aspects of canine and feline care. This is especially true for veterinarians in primary care, as they often see cats and dogs on a preventive basis at annual physical examination and vaccination appointments; these appointments are great opportunities to provide factual information to pet
owners in order to improve welfare in the home. In fact, veterinary visits by owners are often motivated by a desire to seek information and advice. When asked about preferred sources of pet health information, pet owners noted that they are most confident in the information obtained through veterinarians, either in person or by telephone, compared to sources such as the internet, television, books, or family and friends (Kogan et al 2008). This study was based on questionnaires collected from 412 pet owners attending 17 veterinary practices; therefore, participants might have been more likely to value information provided by their veterinarian in comparison to the general pet owning population. Nonetheless, despite the rise in the availability of pet health information online, and concerns that this might cause individuals to either delay or not visit a veterinarian at all, pet owners consulted with veterinarians more frequently than they used the World Wide Web, with only 30% of young pet owners frequently using the internet for animal health advice (Kogan et al 2008). Results of another study, based on data collected in 2010, suggest a similar phenomenon, whereby 39% of pet owners admitted to seeking information online when their pet is ill (Volk et al 2011). Case (1988) surveyed pet owners regarding their expectations of a veterinary visit, and noted that 78% wanted the veterinarian to suggest ways to keep their pet healthy, and 68% believed the veterinarian should have the ability to provide advice regarding behaviour.

For the purposes of preventing health and welfare issues, while also allowing for the early diagnosis and treatment of any issues, a number of topics should be proactively discussed with clients. As part of a preventive health evaluation, history taking should include a discussion of lifestyle, behaviour and diet in every feline and canine wellness appointment (American Animal Hospital Association-American Veterinary Medical Association 2011a, American Animal Hospital Association-American Veterinary Medical Association 2011b). Clients should
also be educated regarding routine diagnostic testing (e.g. fecal and urinalysis), appropriate parasitic control, appropriate vaccinations, and environmental enrichment (American Animal Hospital Association-American Veterinary Medical Association 2011a, American Animal Hospital Association-American Veterinary Medical Association 2011b). For senior pets, preventive client education should focus on the importance of areas such as dental care, nutrition and weight management, mobility, and mental health (e.g. signs of cognitive decline) (Epstein et al 2005). As a proactive approach to weight management, AAHA suggests that nutrition discussions be a part of regular history taking with every patient, such that animals can be screened for potential issues or lifestyle factors that might alter nutritional needs (e.g. low activity level) (Baldwin et al 2010). Despite this recommendation, nutrition is not always discussed; one study noted that nutrition discussions occurred in 61% of all analyzed veterinary appointments, and that almost half of these discussions were actually initiated by the owner rather than the veterinarian (MacMartin et al 2015). Moreover, due to its impact on the ability to recognize pain in the home environment, AAHA also recommends that veterinarians educate every client regarding the recognition and assessment of animal pain, to enable diagnosis and treatment (Epstein et al 2015). Additionally, when the patient is ill, such as when diagnosed with life-limiting cancer, owners also expect to be educated about the assessment of their pet’s quality of life (Stoewen et al 2014). Overall, during wellness appointments, roughly half of all statements made by veterinarians are focused on client education (Shaw et al 2008); broad areas such as lifestyle activities (e.g. exercise) and social interactions (e.g. temperament) are discussed, but biomedical information (e.g. diagnosis and treatment of medical conditions) is often the main focus (Shaw et al 2004a, Shaw et al 2008). Clients can become overwhelmed by the amount of information that is provided verbally during an appointment, and the amount of time scheduled
for the appointment might limit the potential for discussion. Thus, veterinarians should also provide other resources for further consultation (e.g. websites), while also noting appropriate and trustworthy sources of information (Kogan et al 2008, Vogt et al 2010).

The proactive provision of behaviour advice has a particularly notable impact on canine and feline welfare. A lack of behavioural support often leaves animal behaviour problems unaddressed, increasing the chances of a pet being relinquished to a shelter or euthanized for behavioural reasons (Salman et al 2000). Thus, owners should be proactively provided with information regarding common canine and feline behavioural problems, including normal behaviour, basic training principles (e.g. positive reinforcement), risk factors for the development of behaviour issues, and appropriate avenues through which to seek help should these behaviour problems develop (e.g. veterinary behaviourists, qualified trainers) (Gazzano et al 2008, Hammerle et al 2015, Roshier & McBride 2012). A proactive approach, with behavioural assessments performed in every wellness appointment, is particularly crucial for the early identification and intervention of behaviour problems (Hammerle et al 2015). Roshier and McBride (2013) analyzed 17 veterinary appointments, and found that, even though pet owners had identified a total of 58 behaviour problems via questionnaires, only 10 of these issues were actually discussed during appointments. Additionally, although medical and husbandry discussions tended to be primarily initiated by the veterinarian, more than half (55%) of all behaviour statements were instigated by the owner (Roshier & McBride 2012); this suggests that if veterinarians do not employ a proactive approach to behaviour, many problems can persist unaddressed. For this reason, veterinarians should proactively provide guidance to increase owner awareness, such that clients are able to distinguish normal, albeit potentially undesirable, behaviours (e.g. jumping up on humans, chewing) from abnormal behaviours requiring
intervention (e.g. becoming aggressive towards humans) (Hammerle et al 2015, Hetts et al 2004). Proactive discussion is also important for the purposes of prevention. Puppies whose owners were provided with behavioural advice during their first veterinary exam were less likely to develop problem behaviours (e.g. aggression towards strangers or other dogs) by their first annual booster appointment, and their owners were more likely to appropriately employ reinforcement techniques and engage in socialization exercises (Gazzano et al 2008). Similarly, when kitten owners were provided with similar early behavioural advice, kittens were less likely to exhibit nuisance behaviours (e.g. furniture or curtain climbing, excessive vocalization) and tended to be more tolerant of handling and veterinary visits (Gazzano et al 2015). Treatment success can also be improved through ongoing discussion between the pet owner and veterinary staff members. Radosta-Huntley and colleagues (2007) evaluated the impact of a structured versus unstructured follow-up plan for dogs diagnosed with fear-aggression, whereby owners in the structured follow-up group were contacted at three pre-determined intervals post-appointment to continue to discuss behavioural issues or concerns and those in the unstructured group were told to contact the clinic if they required assistance. Owners from the structured group perceived their dogs’ fearful and/or aggressive behaviour as improved, were more satisfied with their veterinarian, and were more willing to return to that veterinary clinic in the future compared to owners from the unstructured group (Radosta-Huntley et al 2007).

Despite the positive effects of providing behaviour information to these owners, other studies suggest that these discussions might not routinely occur. Patronek and Dodman (1999) surveyed more than 800 American veterinarians and noted that while 59% of participants routinely discussed behaviour (e.g. normal species-specific behaviours) or behaviour problems (e.g. inappropriate elimination) in appointments with new kittens or puppies, 54% rated their
discussion of behaviour as infrequent with adult patients during regular wellness appointments. The authors suggested that a lack of confidence in their ability to treat any problems might explain a reluctance to discuss behaviour amongst general veterinarian practitioners (Patronek & Dodman 1999). Moreover, even though pet owners say they use their veterinarian as a main source of advice regarding diet, weight and vaccinations, they are more likely to search elsewhere for information concerning behaviour problems and training advice (Roshier & McBride 2012). Although based on a small sample size (17 pet owners), these results suggest that pet owners might not consider veterinarians to be knowledgeable sources of information regarding animal behaviour, and this view is likely to persist if veterinarians do not proactively initiate discussion and vocalize their ability to provide behavioural advice; not only does this have implications for animal welfare, but also highlights a missed opportunity from a business perspective.

Communication not only has an impact on the home care pets receive, but can also have an effect on client compliance, retention, and satisfaction. Pet owners have an expectation that their veterinarian will educate them using accessible information that is provided upfront and in various forms (Coe et al 2008). When these expectations are not met, clients are less likely to comply with veterinary advice and treatment suggestions (Coe et al 2008). A study conducted by AAHA found that poor communication was a top reason for a lack of compliance with veterinary advice concerning basic health recommendations such as heartworm testing, pre-anesthetic diagnostic testing and core vaccinations (American Animal Hospital Association 2003). Strong communication skills and the provision of information and advice facilitate the relationship between veterinarians and pet owners; this in turn leads to increased loyalty and client retention, and compliance with treatment recommendations, particularly when the benefits of treatment are
fully explained (Lue et al 2008). For example, compliance increased by as much as 40% when clients believed their veterinarian had good communication skills (Lue et al 2008). Additionally, unmet expectations are also linked to lower client satisfaction (Coe at al 2008). Although clients often rank their pets’ treatment as having a higher importance than the manner in which they are treated themselves, post-appointment evaluations reveal that clients’ evaluation of communication is a better predictor of client satisfaction than the veterinarian’s interaction with the animal itself; this suggests that client satisfaction can be more strongly impacted by the client’s experience than the pet’s experience, and highlights the role of veterinarian-client communication in ensuring that appointments are a positive experience for clients (Case 1988).

An increasing understanding of the importance of veterinarian-client communication has also led to an increased consideration of communication as a core veterinary competency. Through focus groups, veterinarians currently in practice in the United States considered communication, including providing information in layman’s terms, to be a major non-technical competency required for a successful career in veterinary medicine (Lewis & Klausner 2003). Similarly, a large-scale, international survey of veterinarians revealed that communication is considered a highly important competency for professional practice, second only to veterinary expertise (Bok et al 2014).

Recognizing the value of veterinarian-client communication, veterinary schools are incorporating communication into their curriculums (Mossop et al 2015). At the Ontario Veterinary College in Canada, veterinary students receive clinical communication training for the first three out of four years of the veterinary medicine program through a combination of formal lectures and practical experiences with simulated clients (Adams & Kurtz 2006, Meehan & Menniti 2014). Faculty members and veterinary practitioners coach veterinary students
through this experiential learning program (Adams & Kurtz 2006). In their final year, Ontario Veterinary College veterinary students complete rotations in a primary care teaching hospital, where examination rooms are equipped with one-way mirrors to facilitate observation and learning, veterinary appointments are audio and video recorded for self-review of communication skills, and students participate in regular communication rounds (Meehan & Menniti 2014). Additionally, amongst seven United Kingdom veterinary schools (i.e. Bristol, Cambridge, Edinburgh, Glasgow, Liverpool, Nottingham, Royal Veterinary College), communication is now formally taught and assessed using lectures, workshops and practical sessions with trained pet owners or actors in at least four years of the five-year programs (Mossop et al 2015). A similar situation exists in the United States where, as of 2009, 82% of the 28 American veterinary schools were offering courses that incorporated communication (Harris & Lloyd 2011). Curriculum changes benefit current and future veterinary students, but post-graduate training programs permit currently practicing veterinarians to benefit as well. Veterinarians who participated in a training intervention program, including coaching and laboratories, provided more animal care-related information to their clients (e.g. biomedical, lifestyle and social information) and engaged in more information gathering than veterinarians who did not receive any communication training (Shaw et al 2010).

In summary, veterinarian-client communication impacts canine and feline welfare in the animal’s home through the provision of information and advice, especially when topics related to welfare are discussed. A number of topics should be discussed proactively with every patient (e.g. preventive veterinary medicine, diagnostic testing, nutrition), while other topics should be routinely discussed with senior pets (e.g. mobility) or ill patients (e.g. quality of life). The
proactive provision of behavioural advice is particularly important, as it has been shown to effectively prevent the development of behaviour issues in puppies and kittens and improve behavioural treatment success in adult animals. Communication not only impacts animal welfare, but it also has an effect on client compliance, retention, and satisfaction. As such, communication is now considered a core veterinary competency, and has been incorporated in veterinary curricula as a result.

_Veterinary-patient interactions, handling and restraint_

A number of veterinary behaviourists and organizations have discussed and published guidelines outlining principles of ‘low-stress’ handling, with the recommendation that many of these techniques be routinely employed to both minimize and prevent fear (Anseeuw et al 2006, Hammerle et al 2015, Herron & Shreyer 2014, Rodan et al 2011). It is important to note, however, that many of these recommended or condoned handling and restraint methods have yet to be scientifically investigated. For instance, scruffing, whereby the skin on the back of the cat’s neck is manually pinched to induce behavioural inhibition, is hypothesized to be an aversive restraint method as it induces a loss of control (Rodan 2010, Rodan et al 2011). As such, it has been widely discouraged by veterinary organizations (e.g. AAFP), even though no scientific studies have measured the impact of scruffing on feline welfare. Many of the recommendations discussed below are thus, largely based on expert opinion, and additional research is required to experimentally validate that these techniques limit or reduce patient fear, stress or aggression and improve patient welfare. Despite this limitation, those who have advocated for these methods have a strong understanding of canine and feline behaviour, and a wealth of clinical experience
in which they have anecdotally observed the effects of different handling and restraint strategies. Whenever available, scientific evidence is discussed.

When approaching patients, veterinary staff should use non-threatening body language, including kneeling or sitting on the floor to avoid leaning over the pet, turning to the side, avoiding direct eye contact and engaging in slow, calm, subtle movements while speaking softly (Herron & Shreyer 2014, Moffat 2008, Rodan 2010). It is important to work according to the animal’s pace, and to adjust speed accordingly and provide breaks if patients show hesitation (Anseeuw et al 2006, Hammerle et al 2015). Veterinary staff should also allow the animal the ability to initiate contact and approach at their own will, rather than forcing interaction (e.g. petting) at greeting, which might enable patients to have a greater sense of control (Moffat 2008, Rodan 2010). For feline patients, the carrier can be left open during history taking to provide the cat with time to exit the carrier, explore the room, and become accustomed to the veterinarian’s voice and smell prior to any interaction (Anseeuw et al 2006, Rodan et al 2011). Treats or other palatable food items can be left throughout the examination room to encourage exploration and lure patients out of carriers or towards veterinary staff (Anseeuw et al 2006, Hammerle et al 2015). If the cat will not exit the carrier independently, carriers should be taken apart, whenever possible (Rodan et al 2011). Even if carrier design does not allow disassembly, dragging or pulling the cat, as well as tipping and shaking the carrier, are aversive methods of removing feline patients from carriers, and should be avoided (Rodan et al 2011).

In terms of the physical examination, dogs and cats might remain more calm and cooperative if veterinarians are flexible with the location where they are performed. Physical examinations should be performed wherever the animal is comfortable (e.g. on the owner’s lap, on the window sill, on the floor, in the car in the parking lot), rather than forcing a traditional
examination on the examination table (Moffat 2008, Rodan et al 2011). When placed under the patient, non-slip mats, such as yoga mats or rubber-backed carpets, can provide additional traction and help provide the patient with a greater sense of control (Rodan et al 2011). For cats, if the top has been removed from the carrier, it is often possible to complete much if not all of the physical examination in the bottom of the carrier, such that removal from the carrier is not even necessary (Anseeuw et al 2006, Ellis et al 2013, Rodan et al 2011). If necessary, the top of the carrier can be replaced with a towel, which permits both hiding and prepares for a towel wrap, should it be needed to increase patient control (Anseeuw et al 2006, Ellis et al 2013, Rodan et al 2011). Cats might also feel more at ease if provided with a box or basket, and examinations can also be completed in them. Veterinary staff should generally be prepared to adapt to patient needs (e.g. kittens and puppies can be distracted by toys, older animals might require softer surfaces) (Rodan et al 2011). To reduce unnecessary arousal, efforts should be made to examine patients with the least number of staff members possible (Anseeuw et al 2006); this principle also applies to vaccinations and other procedures. It is also useful to assess whether owner presence reduces or increases stress and anxiety; separation might be helpful if the owner is also anxious (Moffat 2008, Herron & Shreyer 2014).

Restraint has been found to be aversive to dogs and cats. In experimental situations, dogs restrained by being pressed to the floor via force applied to their neck or back and pulled to the floor via their collar show an increase in body shaking, lip licking, and heart rates, indicating that manual restraint can be stressful (Beerda et al 1998). Laboratory-raised cats subjected to treatments including being restrained in a cat bag for 20 minutes and grabbed by a gloved hand showed greater cortisol responses on ACTH tests, compared to baseline, and higher urine cortisol concentrations, compared to a control group (Carlstead et al 1993). Cats in the
The experimental group also showed an increase in alertness and decrease in exploratory and play behaviour (Carlstand et al. 1993). Although this suggests that restraint is stressful for cats, results are confounded because cats in the treatment group also experienced an unpredictable cleaning and feeding routine, and were deprived of positive human interaction (e.g., petting) (Carlstand et al. 1993). The physiological stress response induced by heavy restraint also lowers the efficacy of chemical restraint, including sedatives, and thus limits the range of possible restraint methods should manual restraint be insufficient (Hammerle et al. 2015). Moreover, unnecessarily heavy restraint, such as having multiple staff members restrain a patient for a nail trim, scruffing a relaxed cat, or pinning dogs for injections, can cause calm, cooperative patients to become fearful and uncooperative (Hammerle et al. 2015). It also increases the likelihood that the patient will struggle, further leading to an increased risk of injury for both the patient and veterinary staff members (Hammerle et al. 2015). When considering the degree of restraint required for veterinary patients, the principle of ‘less is more’ is paramount, and procedures should always be completed with the least restraint possible (Hammerle et al. 2015, Herron & Shreyer 2014).

A number of devices and tools can assist with patient handling and restraint. Towels or blankets can be used to wrap around small dogs and cat patient bodies to create ‘burritos’ that contain and control animal limbs, or wrapped and rolled around the neck to permit additional control over the head (Hammerle et al. 2015). Towel or blanket wraps provide secure control, help to protect veterinary staff members from flailing limbs, reduce direct skin-to-fur contact, and are generally not considered aversive nor offensive to owners (Hammerle et al. 2015, Herron & Shreyer 2014, Rodan et al. 2011); thus, they are recommended as a handling and restraint method for fearful or aggressive patient undergoing various routine procedures (e.g., blood draws, nail trims) (Hammerle et al. 2015, Rodan et al. 2011). Towels or blankets can also be
draped over patients’ heads to cover eyes and block visual stimulation, thereby reducing arousal and often inducing a freezing response, especially in cats (Anseeuw et al 2006, Moffat 2008, Rodan et al 2011). The ‘Calming Cap’ and muzzles that cover eyes can also have a similar effect (Anseeuw et al 2006, Herron & Shreyer 2014). In a general sense, muzzles primarily function to reduce the risk of bite injuries to veterinary staff members, which might decrease staff anxiety when handling potentially aggressive patients (Hammerle et al 2015). By calming the handlers, muzzles can indirectly work to help calm patients, and allow for less manual restraint in order to maintain staff safety (Hammerle et al 2015, Moffat 2008). If muzzles are to be used, basket muzzles are preferred, as they do not interfere with breathing or panting, and allow the provision of treats or food (Hammerle et al 2015, Moffat 2008). Animals are usually not receptive to muzzles, however, unless they have been previously exposed and desensitized to them, so their use in veterinary patients might be limited (Hammerle et al 2015, Moffat 2008). Other devices that offer control over the head include head collars, halters, and Elizabethan collars (Hammerle et al 2015, Herron & Shreyer 2014). ‘Clipnosis’ or ‘clipthesia’ are terms used to refer to the behavioural inhibition induced through the application of binder clips, clothespins or Clipnosis Gentle Calming Clips along the dorsal midline of cats (Pozza et al 2008). Studies of the welfare implications of using clips have produced mixed results: some (e.g. Pozza et al 2008, Valente et al 2013) have observed no significant differences in heart rate, blood pressure, body temperature or anxious behaviour in cats with or without clips applied, while others (e.g. Nuti et al 2016) have noted lower heart rates, reduced incidence of pupil dilation and no difference in plasma cortisol concentrations when using clips compared to manual scruffing. As clipnosis is similar to scruffing, the use of clips is controversial (Herron & Shreyer 2014, Rodan et al 2011); some veterinarians believe it induces a state of freezing rather than a state of relaxation, particularly
since it diminishes the cat’s sense of control, and that is should only be used when no other alternatives are available (Herron & Shreyer 2015, Rodan 2010, Rodan et al 2011). Additional research regarding behavioural responses to clipnosis is required to evaluate whether it is a welfare-friendly restraint method for cats.

A number of other devices might be helpful for restraint; although they are generally considered less desirable options, these devices are still preferable to standard physical restraint. Cat squeeze and clamshell nets can be useful when delivering intramuscular injections, such as sedatives, but should only be reserved for brief periods of restraint, or for emergency situations (Hammerle at al 2015, Rodan et al 2011). Cat bags do not offer full control when loose, but increase anxiety when too tight (Rodan et al 2011); however, they are thought to induce less stress than heavy manual restraint (Moffat 2008). While gloves aid to protect handlers from animal-induced injuries, they offer less control than other devices, limit the movement of the handler, and veterinarians believe that they are aversive to most patients (Moffat 2008, Rodan et al 2011). As a whole, the use of certain devices, although helpful for examining fearful or aggressive patients, might not be well tolerated, so it is essential that patient behaviour is monitored following their application to ensure that they do not worsen the situation (Hammerle et al 2015).

If low-stress techniques are ineffective at reducing patient fear and stress, chemical restraint is considered preferable to manual physical restraint (Moffat 2008); chemical restraint is recommended if the patient is agitated, the procedure might induce pain or discomfort, and other forms of restraint do not maintain staff safety (Rodan et al 2011). Along the same lines, if patients have a history of fear or aggression during veterinary visits, veterinarians can suggest that owners pre-medicate their pets with anxiolytics or sedatives prior to the visits (Hammerle et
Successful and unsuccessful approaches should always be entered into the patient’s file for future reference (Moffat 2008).

The prevention of fear is often more efficient and successful than managing a fearful patient. Veterinary staff should ensure that early puppy and kitten visits are especially positive, because both unpleasant and pleasant experiences will condition the animal and impact behaviour for future visits (Hammerle et al 2015, Hetts et al 2004). In fact, dogs with at least one prior negative experience at the veterinary clinic tend to be more fearful than those who have only had previous positive experiences (Döring et al 2009). Furthermore, Glardon and colleagues (2010) noted that all dogs and cats exhibiting aggression during physical examinations were 3 years of age or older, suggesting that it might be a learned behavioural response. By holding puppy and kitten classes in the veterinary clinic, socialization to the clinic environment can begin at a young age; these can also double as an opportunity to educate pet owners about appropriate training methods and highlight that veterinarians can act as a resource for animal behaviour and behaviour problems (Hetts et al 2004, Rodan et al 2011). Socialization visits, in which the pet only experiences positive outcomes like food rewards, are also helpful for teaching adult dogs and cats that clinic visits are not always a fearful or painful experience (Hetts et al 2004). To prepare for being handled in unfamiliar ways, veterinary staff should encourage pet owners to practice mock physical examinations at home, in which the pet’s ears, mouth, paws, and legs are manipulated (Rodan et al 2011). During veterinary appointments, staff can and should counter condition patients to physical examinations and procedures like vaccinations and nail trims using treats and other highly palatable food items (Hammerle et al 2015, Herron & Shreyer 2014, Hetts et al 2004, Westlund 2015). Moreover, all appointments should end with a treat (Moffat 2008). As a whole, all positive behaviour should be rewarded, and all negative
behaviour should be ignored (Anseeuw et al 2006). Owners might model their behaviour towards their pet after veterinary staff, so appointments are also an excellent opportunity to model positive reinforcement for good behaviour rather than punishment for inappropriate behaviour (Hetts et al 2004). Staff can also recommend that owners bring in familiar items from home, such as a blanket with a familiar scent or a favourite toy that can be used for play breaks (Moffat 2008, Rodan et al 2011).

It is important that all veterinary staff members, including technicians and kennel staff, are able to identify fear-related canine and feline body language and behaviour, such that measures can be taken to calm patients at the earliest signs of fear (Hammerle et al 2015, Rodan et al 2011). Veterinary clinics should ensure that staff members have ample opportunities to learn about relevant animal behaviours through continuing education, in-clinic training sessions, or a readily available photo or video library (Anseeuw et al 2006, Hetts et al 2004). On the same note, veterinary staff should also be provided with opportunities to learn and practice various handling techniques, particularly since techniques like low-stress handling have only recently begun to be included in veterinary curricula. Generally, veterinary students in the United Kingdom, Australia and New Zealand are provided with between one and half and three hours of practical, laboratory-based classes focused specifically on practicing handling techniques with dogs and cats (Austin et al 2007, Cawdell-Smith et al 2007, Cockram et al 2007, Stafford & Erceg 2007). A number of these veterinary curriculums (e.g. Massey University, University College Dublin) emphasize the use of handling and restraint methods that maintain handler safety (Hanlon et al 2007, Stafford & Erceg 2007). Naturally, other activities (e.g. anatomy exercises) provide students with opportunities to gain additional handling practice; however, students are unlikely to receive feedback during these activities (Austin et al 2007). Nonetheless,
veterinary clinics should not rely solely on formal education to teach proper animal handling and restraint techniques, especially since veterinary assistants and other staff members who have not completed formal programs often handle patients.

In summary, recently recommended and discouraged handling techniques are often based on expert opinion, and further research is needed to definitively prove that these techniques aid in reducing patient fear and stress. When approaching patients, veterinary staff should use non-threatening body language, allow patients to make initial contact, move slowly, and provide treats. Physical examinations should be performed wherever the animal is most comfortable, using items that increase surface traction or allow cats to hide (e.g. boxes, baskets), and with or without the owner present. Physical restraint is aversive to dogs and cats. Some handling tools (e.g. towels, muzzles, Elizabethan collars) can assist with patient handling and restraint, while other handling tools (e.g. cat squeeze nets, cat bags, gloves) are thought to be less desirable devices. The prevention of fear is more effective than treatment. As such, puppy and kitten visits should always be positive, socialization visits should be encouraged for all patients, and positive reinforcement and counter conditioning techniques should always be used. Additionally, all staff members should be able to identify fear behaviours and respond accordingly.

Features of the clinic environment

Scientific studies investigating the environmental needs of cats and dogs in confined settings have focused mostly on laboratory and shelter environments, and few have been conducted in the veterinary clinic setting. As laboratory and shelter animals tend to have a longer duration of stay, their needs might be different than those of feline and canine veterinary
patients. Moreover, medical requirements can make the provision of certain items inappropriate (Rochlitz 1999). Nonetheless, this body of literature provides some guidance for the management of the environmental needs of veterinary patients.

Space allowance

Minimum space requirements for feline and canine cages exist for the laboratory environment (e.g. National Research Council 2011). Specific numerical values are not relevant for cages in a clinic setting due to differences in the typical duration of stay, but certain principles, such as sufficient vertical height to allow cats to be provided with elevated structures and dogs to comfortably stand and turn around, are still relevant for the housing of hospitalized patients in veterinary clinics (National Research Council 2011). Jumping and climbing are natural feline behaviours, and cats might feel more safe when permitted to rest or monitor their surroundings from elevated locations, so efforts should be made to allow for this by providing adequate vertical space, whenever medically appropriate (Ellis 2009, Newbury et al 2010). Cats also prefer separate eating and toileting areas, with negative effects on food intake when there is less than two feet of distance between the litter box, food and resting areas (Bourgeois et al 2004, Ellis et al 2013, Rochlitz 1999). As such, efforts should be made to, at minimum, place the litter box and food and water dishes in opposite corners of the cage floor to maximize distance between these areas. The addition of a shelf also provides a resting area separate from eating and toileting areas (Gourkow & Fraser 2006). In terms of cage flooring, even though metal and plastic floored cages are easier to clean, cats have a preference for materials that maintain temperature, and so fleece blankets, old cotton clothing, or even paper shavings placed in the
base of the cage can improve the experience for hospitalized feline patients (McCune 1995). Similar research into canine substrate preferences has not yet been conducted.

Enrichment

Cats have a preference for both elevated surfaces and hiding structures (Ellis 2009). Hiding is a behavioural response that permits cats to cope with a stressful situation (Ellis et al 2013). When cats are provided with hiding places, they are better able to adapt to a novel environment (Gourkow & Fraser 2006). Cardboard boxes placed on their side are cheap and disposable, and can function as hiding places as well as shelves, provided they are solid enough to support a cat’s body weight (Ellis et al 2013, Rochlitz 1999). With this principle in mind, ‘Hide & Perch’ cardboard boxes, incorporating a hiding space with two entrances and an elevated resting area, have been developed by the British Columbia Society for the Prevention of Cruelty to Animals for use in the shelter environment (Ellis 2009). The provision of Hide & Perch® structures has been shown to significantly reduce stress in shelter cats, as measured by cat stress scores, as early as the second day after the addition of the structure (Kry & Casey 2007); this short time frame is in line with the duration of stay for some hospitalized patients, and thus similar results might also be expected in a clinical setting. Moreover, shelter cats provided with Hide & Perch® structures spent the majority of their time hiding in the structure, whereas cats in the control group spent the majority of their time hiding behind their litter box (Vinke et al 2014). A study of laboratory cats noted a similar effect, whereby hiding behind the litter box was negatively correlated with urine cortisol concentrations (Carlstead et al 2003). The ability to hide thus appears to be important to feline welfare; however, veterinary clinics might be opposed to the use of a box as it would restrict visibility, which would be inappropriate for patients that
require close monitoring. As such, placing a towel over the front of the cage door might be more appropriate in certain cases, and would still provide veterinary patients with the ability to hide without fully restricting visibility (Ellis et al 2013, Herron & Shreyer 2014).

Shelves, perches, boxes, and toys can also be placed in examination rooms, and might help distract patients and provide them with a sense of control over their environment (Anseeuw et al 2006). Veterinary staff members can also ask owners to bring favourite toys or blankets to help patients feel more comfortable if hospitalization is necessary (Rodan et al 2011). When provided with a horizontal shelf and two toys, shelter cats had lower cat stress scores than those who were in a simple, non-enriched cage (Gourkow & Fraser 2006). These effects were notable as of the second day of treatment, suggesting that shelves and toys reduce fear behaviour in cats that must be confined for more than a day. However, cats in the enriched treatment group were also handled differently from the control group, so it is difficult to tease out of the effects of enrichment alone (Gourkow & Fraser 2006). Furthermore, in a laboratory setting, cats provided with a suspended ball toy spent significantly less time inactive and more time in play (de Monte & Le Pape 1997). In a veterinary clinic, however, where patients are often hospitalized to allow for recovery from surgical procedures, this increase in activity might not be ideal. The provision of time outside of the cage for socialization and play might be better suited than the provision of toys in the cage itself, as activity can then be better controlled (Ellis et al 2013). Catnip toys might act as both interactive and olfactory enrichment (Ellis 2009). Feeding enrichment, such as the use of food balls or puzzles, can also improve welfare, and have been shown to decrease barking in dogs (Schipper et al 2008), but is likely not relevant for veterinary patients given their typically short duration of hospitalization. Feeding enrichment would also be inappropriate for patients with food restrictions.
In the shelter setting, dogs show a preference for toys that permit chewing, compared to toys such as balls and tug ropes (Wells 2004a), although other studies (e.g. Wells & Hepper 1992) have shown that the single-housed shelter dogs often let toys go unused. In a veterinary setting, where dogs are usually single-housed, there are situations in which a toy might be inappropriate, such as a chew toy when recovering from dental surgery or when animals are left unsupervised with potentially ingestible toys. Studies have also shown that laboratory dogs use ‘cage furniture’, like elevated platforms, heavily for resting (Hubrecht 1993). Moreover, shelter dogs provided with bunk beds had higher quality of life scores, based on both unprovoked and provoked behaviour, than dogs were not provided with bunk beds in their cages (Kiddie & Collins 2015).

Human interaction can also act as a form of both social stimulation and enrichment, while reducing stress in animals that require hospitalization for extended periods of time. Hennessy and colleagues (1998) observed that a 20-minute petting session with an unfamiliar individual reduced the cortisol levels of shelter dogs after undergoing blood collection procedures, compared to dogs that were simply returned to their cage immediately. Results suggest that petting can help to mitigate stress following aversive procedures and treatments. Menor-Campos and colleagues (2011) noted that shelter dogs that participated in 25 minutes of exercise, play and positive human interaction sessions had lower salivary cortisol levels and scored higher on behavioural tests; although the details of these tests were not provided by the authors, they suggest that positive human interaction can have a beneficial impact on the welfare of confined dogs. Cats’ and dogs’ tolerance to this human interaction, including the perception of it as a positive rather than negative event, is dependent on the individual animal’s socialization to humans, and thus, the decision to provide additional interaction beyond medical necessity (e.g.
when not medicating, checking wounds or assessing pain) should be assessed on an individual patient level (Ellis 2009, Heath & Wilson 2014). Nonetheless, predictable interaction via consistent schedules and caregivers can improve the reception of human interaction among both dogs and cats (Ellis et al 2013, Taylor & Mills 2007).

Auditory stimulation

Dogs and cats can hear sounds over a broader frequency range than humans: dogs can hear sounds between 67 and 44 000 Hz, cats can hear sounds between 55 and 79 000 Hz, and humans can hear sounds between 31 and 17 600 Hz (Heffner 1998). Dog and cat hearing is thus more sensitive at high frequencies; therefore, they might be affected by noises outside of human hearing range, of which humans are not aware. In a general sense, noise is a stressor for animals, and excessive noise in a veterinary clinic setting might over-stimulate veterinary patients (Coppola et al 2006). This is especially true for cats, which are particularly affected by dog barking, as is to be expected in the waiting and hospitalization areas when cats are mixed with dogs (McCobb et al 2005). To reduce the detrimental effects caused by a noisy environment, veterinary staff members are encouraged to use soft, low voices at all times (Anseeuw et al 2006, Herron & Shreyer 2014, Rodan 2010). Moreover, veterinary clinics should consider using acoustic ceiling tiles and rubber flooring, both of which can aid in the absorption of noise to help maintain a calm, quiet environment (Anseeuw et al 2006). Noise cancelling sources, such as white noise, can also aid to reduce or avoid the detrimental effects of noise (Herron & Shreyer 2014).
Olfactory stimulation and use of pheromones

Similar to their sense of hearing, cats, and especially dogs, also have a stronger sense of smell than humans, and both have vomeronasal organs for the detection of chemical stimuli (Bradshaw et al 2012, Heffner 1998). Dogs and cats might consequently be sensitive to odours humans might not even detect, such as those left by previous patients (Rodan 2010). By virtue of having both a large number of animal visitors, including different species, and the use of anti-bacterial and anti-viral disinfectant products, veterinary clinics have the potential to be over-stimulating in terms of scents (Taylor & Mills 2007). Alcohol and other cleaning products have a strong and potentially aversive scent, so areas should be cleaned with enough time to allow scent to dissipate prior to the animal entering the room (Herron & Shreyer 2014). After an appointment with a fearful patient, the examination room should be thoroughly cleaned and aired out, including the use of aerosol pheromones, to minimize the chances of any alarm scents or pheromones negatively affecting the next patient (Anseeuw et al 2006, Herron & Shreyer 2014). Conversely, familiar scents can help to reduce stress, so veterinarians should consider allowing pet owners to leave blankets, towels or other familiar items with their pet for the duration of their veterinary stay, no matter how short (Ellis et al 2013, Rodan 2010).

A growing body of research recommends the use of pheromones to reduce fear and stress in companion animals. Diffusers for synthetic pheromone analogue products (e.g. Feliway®) can be placed throughout the veterinary clinic (i.e. waiting and rooms, treatment and housing areas) to help reduce patient fear and improve the veterinary experience (Anseeuw et al 2006). For example, hospitalized dogs exposed to the dog appeasing pheromone (DAP) for four days via diffusers in their housing areas showed significantly less elimination and fewer pacing and “excessive licking” behaviours than dogs from a placebo control group, suggesting that DAP
decreases separation-related stress in canine veterinary patients (Kim et al 2010). Among client-owned dogs with a history of fear and aggression at the veterinary clinic, who also acted as their own control, a DAP diffuser reduced the duration of anxious behaviours and increased the duration and frequency of behaviours indicative of relaxation in the waiting and examination rooms (Mills et al 2006). Aerosol forms of these products also exist, and can be sprayed on tables, towels, and staff clothing to further mitigate fear and stress (Anseeuw et al 2006, Herron & Shreyer 2014, Rodan et al 2011). Griffith and colleagues (2000) provided hospitalized cats with towels that had previously been sprayed with either feline facial pheromone or the vehicle for the pheromone (i.e. control). Cats exposed to feline facial pheromone showed increased grooming, interest in food, and facial rubbing compared to cats in the control group (Griffith et al 2000). Similarly, Kronen and colleagues (2006) investigated the behavioural responses of cats given cage paper sprayed with feline facial pheromone (Feliway®). Compared to cats exposed to a placebo spray, cats exposed to Feliway® were calmer based on their body and leg positions; however, no differences in struggling during catheterization were observed (Kronen et al 2006).

Separation by species

To reduce patient stress due to various stimuli (e.g. auditory, olfactory, visual), it is recommended that cats are kept separate from dogs throughout all areas of the veterinary clinic, including but not limited to the waiting room and housing areas (Anseeuw et al 2006, Ellis et al 2013, Hammerle et al 2015, Rochlitz 1999). Dogs might perceive cats as prey, and behave accordingly, which might cause cats to feel threatened. Ideally, a veterinary clinic would have a completely separate canine and feline section of the waiting area and separate rooms for hospitalization stays, but if this is not possible, visual and/or physical separation can be achieved.
through the use of barriers (Hammerle et al 2015, Heath & Wilson 2014). Alternatively, temporal separation, by scheduling canine and feline appointments for separate parts of the day, and ushering patients straight into the examination room can also reduce interactions in the waiting room (Anseeuw et al 2006, Hetts et al 2004, Rodan et al 2011). If owners have an elevated surface on which to place cat carriers, it can also prevent dogs from directly approaching cat carriers (Rodan et al 2011). Even within the same species, ideally hospitalization cages should not directly face each other to minimize visual contact between patients (Ellis et al 2013, Rodan et al 2011). Moreover, multiple entrances and exits permit the separation of patients as they are entering and exiting the clinic (Anseeuw et al 2006, Ellis 2009, Herron & Shreyer 2014, Hetts et al 2004).

Surface traction

Slippery surfaces can causes slips and falls, which are generally associated with increased stress levels and increased risk of injury amongst agricultural animals (Terlouw et al 2008). One might expect low traction surfaces to also cause stress in dogs and cats. The traction of stainless steel examination tables can be easily increased through the use of non-slip mats, yoga mats, carpets, and foam mats (Hammerle et al 2015, Herron & Shreyer 2014). Nonslip flooring can also help dogs and cats to feel secure, thus reducing fear (Hammerle et al 2015).

Lighting

Cats and dogs might find bright lights aversive, so lowered light levels are recommended throughout the veterinary clinic, whenever practical (Anseeuw et al 2006, Herron & Shreyer 2014). When patients are placed in stacked cages, attention should be given to differences in the
light levels at different levels: those at the bottom might be left in darkness whereas those
towards the top might be exposed to excessively bright lights (Newbury et al 2010). Lighting
schedules in housing areas should coincide with natural circadian rhythms (Newbury et al 2010);
in other words, lights should be turned off at night. Moreover, lower lights can also be effective
in calming patients (Herron & Shreyer 2014).

Physical climate

In the veterinary clinic, temperature, humidity and ventilation are unlikely to be an issue
as humans also share the environment, and these aspects of the physical climate tend to be well
controlled for human comfort. Nonetheless, guidelines from the companion animal shelter and
laboratory settings outline that ambient temperatures should remain between 15.5°C and 26.6°C,
with relative humidity between 30% and 70% (AVMA 2016). Individual animal behaviour (e.g.
shivering, panting) should always be monitored to determine whether animals are able to
maintain normal body temperatures (Newbury et al 2010). General anaesthesia causes
hypothermia, and normal thermoregulation is slowly restored in post-surgical patients
(Armstrong et al 2005). Post-surgical patients might thus require higher temperatures, and
providing heated bedding or other warming tools (e.g. heating discs, warm water bottles) can
help to moderate temperature at the microclimate level. Adequate ventilation is important to
reduce the spread of infectious diseases, and 10 to 20 room air exchanges per hour are
recommended in facilities housing animals (Newbury et al 2010).
Study rationale

As outlined above, veterinary care can impact canine and feline welfare, both positively and negatively, in a number of ways. Based on the scientific literature, these factors might include: acute and chronic pain management, veterinarian-client communication of information regarding pet care, veterinary-patient interactions, including handling and restraint, and physical features of the clinic environment. Despite the link between veterinary care and animal welfare, as well as a growing interest in developing formal welfare assessment schemes for agricultural species, there are no existing assessment schemes to evaluate and improve companion animal welfare in veterinary clinics. Moreover, there is a gap in knowledge with respect to the welfare-related practices currently in use in companion animal veterinary clinics.

Research objectives

To address the research gaps described above, the overall objectives of this thesis are as follows:

1. Determine key veterinary care-related factors that are important to canine and feline animal welfare (Chapter 2);
2. Develop a draft canine and feline welfare assessment tool for use in general veterinary practice;
3. Evaluate this draft welfare assessment tool in Ontario companion and mixed animal veterinary clinics to assess the tool’s inter- and intra-observer reliability, validity, and feasibility of use (Chapters 3, 4 and 5);
4. Determine the current standard of animal welfare in Ontario veterinary clinics based on the draft welfare assessment tool in order to permit benchmarking of established industry
best practices to allow for the assessment of changes in practices and improvement over time (Chapters 3, 4 and 5).
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CHAPTER TWO

A survey of animal welfare experts and practicing veterinarians to identify and explore key factors thought to influence canine and feline welfare in relation to veterinary care

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Abstract

Veterinary care is important for maintaining companion animal health; however, it also has the potential to impact other aspects of patient welfare. To investigate factors related to veterinary care that are likely to influence canine and feline welfare, animal welfare researchers, veterinarians with an expertise in animal welfare, and Canadian and American companion and mixed animal veterinarians were invited to participate in a three-stage online survey. Participants were asked to do the following: 1) identify factors related to the veterinary experience that impact patient welfare; 2) rate the relative impact of each factor; and 3) gauge the feasibility of measuring and improving each factor. Overall, 78 participants identified 85 factors that impact animal welfare in the clinic (e.g. restraint techniques) and home environment (e.g. advice regarding behaviour and training). Among factors, seven themes emerged: physical environment of the clinic; routine animal care provided by veterinary team members (“staff”); interactions between the patient, staff, and client; clinic management; medical and surgical procedures; staff attitudes and education; and communication between the veterinarian and client. Mean relative impact scores ranged from 1.0 to 3.8 on a five-point scale (0-4), with 70% of factors receiving a score greater than 3. Most participants (> 80%) agreed that 68% of the identified factors could be feasibly improved in an average veterinary clinic and that 43% of the factors could be feasibly measured during a welfare assessment. These results identify key areas where veterinary care
may impact the welfare of canine and feline patients and highlight priority areas where assessment and improvement are possible.

**Key words:** animal welfare, cat, companion animal, dog, veterinary practice

**Introduction**

Regular veterinary care is widely recognized as an integral part of ensuring the health of companion animals, which in turn can positively impact their welfare through the prevention and treatment of injury and disease. In addition, veterinary care has the potential to positively impact other aspects of patients’ overall welfare. For example, veterinarians are a reliable source of knowledge about animal care for owners, and often provide general advice about topics that are important to an animal’s well-being, such as appropriate training, exercise, and nutrition. In fact, a survey of stakeholders in the education, industry, government, charity, and veterinary sectors in Great Britain revealed that out of the 31 factors suggested to positively enhance canine welfare, access to and quality of veterinary care was the most commonly cited factor (Buckland et al 2013).

Although veterinary care has obvious positive impacts on animal welfare, it can also have negative effects. Veterinary visits are often a stressful experience for dogs and cats; they usually involve entering a new environment, interacting with unfamiliar animals and people in unusual ways, and undergoing procedures that may be painful. These experiences might even lead to the development of a conditioned avoidance response to the clinic environment (Beaver 1999; Vollmer 1977). Stanford (1981) noted that 70% of healthy dogs visiting a veterinary clinic for routine wellness examinations were reluctant to enter the clinic. Glardon et al (2010) observed
that 37% of dogs and 42% of cats were generally categorized as reserved, fearful, or agitated during routine physical examinations. Döring et al (2009) reported that 78% of dogs undergoing a routine physical examination were considered to be fearful based on defined behavioural parameters, including lowered tail and body posture, trembling, fixated staring, and avoidance behaviours. Moreover, 80% of healthy dogs waiting to undergo a routine ovariohysterectomy exhibited signs of stress in their cage, such as panting and displacement behaviours (Väisänen et al 2005). Puppies between eight and 16 weeks of age showed similar signs of stress at the veterinary clinic, with 62% performing lip licking and 19% yawning while being examined on a table, and 24% panting during manipulations and restraint on the floor (Godbout et al 2007).

Beyond the effect on the patient, a negative experience at the veterinary clinic can also compromise the safety of all veterinary team members (“staff”). When fear leads to aggression, staff members are at risk of being injured. For instance, Stanford et al (1981) found that 18% of the dogs in their population were ‘fear-biters’ who attempted to bite their examiners, and in a recent study assessing physical examinations, 16% of dogs and 13% of cats were reported to be aggressive or dangerous (Glardon et al 2010). Furthermore, Marcella (1983) found that 6% of dogs and 4% of cats in a single veterinary practice had a documented history of unprovoked and consistent aggression toward clinic staff members.

Both fear and aggression in animals have the potential to influence client satisfaction and willingness to seek further veterinary care. Even though the total number of pets owned in the United States is increasing, veterinary visits have shown a declining trend, with approximately 15% of dogs and 40% of cats not being brought to a veterinarian on a yearly basis (American Veterinary Medical Association 2007; Volk et al 2011). Rodan (2010) suggested that the handling and reaction of feline patients at the clinic might explain clients’ reluctance to bring
their cats to the veterinarian for regular wellness appointments. Indeed, stress associated with visiting the veterinary clinic, both for the animal and owner, is one of the three main client-driven factors that appears to be contributing to the decreasing use of veterinary care, particularly for felines; 58% of cat owners and 38% of dog owners agreed that their “pet hates going to the vet”, whereas 38% of cat owners and 26% of dog owners agreed that simply the idea of visiting the veterinarian is stressful (Volk et al 2011). This is unfortunate because, although the experience of visiting the clinic may be unpleasant, in addition to ensuring their patients’ health, veterinarians are also in a strong position to influence their patients’ welfare beyond the clinic environment.

Despite the link between veterinary care and companion animal welfare, both within and beyond the hospital environment, this area of research has received only minimal attention. To date, most welfare-related veterinary research on companion animals has focused on the development of new treatments and procedures. The outcomes for these new treatments and procedures tend to be evaluated using health-based assessments and laboratory parameters. In addition, this type of welfare evaluation is usually more disease-specific rather than a holistic evaluation of the patient’s welfare (Christiansen & Forkman 2007). For instance, researchers have developed tools to assess the impacts of cardiac disease (Freeman et al 2005), pain resulting from cancer (Yazbek & Fantoni 2005), and chronic pain (Wiseman-Orr et al 2004) on the health-related quality of life of canine patients. Although these tools attempt to assess quality of life, they offer little guidance or advice with regard to evaluating the overall influence of veterinary care on the well-being of patients. As such, there is a gap in knowledge with regard to the impact of veterinary care on overall welfare, taking a holistic view and encompassing more than physical health.
Through multiple rounds of expert consultation, this study aims to identify aspects of veterinary care that impact companion animal welfare, both in the veterinary clinic and home environment. The study also explores the extent to which these factors impact animal welfare and the feasibility of improving and measuring each factor in a typical companion animal veterinary clinic.

Materials and Methods

Online surveys were created and run with LimeSurvey (version 1.91+), and hosted on the University of Guelph online server. The survey period was from June 2012 to November 2012, with each of the three stages of the survey kept open for four weeks. For each stage, reminder e-mails were sent to non-responders one and three weeks after the initial invitation. Invitations to participate in each stage were sent regardless of participation in the previous stage(s). For Stages II and III, the threshold for inclusion of a participant’s response was completion of at least 80% of all questions in which factors were asked to be rated (68/85 and 136/170 questions, respectively). This study was approved by the Research Ethics Board at the University of Guelph (REB # 12JA032; see Appendix I for recruitment email and Appendix II for consent form).

Invited Participants

A total of 990 electronic invitations, each with a unique token for secure access to the online survey site, were sent to three categories of experts: animal welfare researchers; veterinarians with expertise in animal welfare; and practicing companion or mixed animal veterinarians. These three groups were included to take advantage of their various areas of expertise; animal welfare researchers have the theoretical knowledge to identify factors that may
impact welfare and comment on those suitable for assessment, while veterinarians have the practical experience to assess the practicality of improvement. Animal welfare researchers (n = 43) were selected through literature searches and online searches of faculty webpages using inclusion criteria based on the animal welfare subject area of their current and/or published research and the possession of a doctorate degree. Animal welfare researchers may have had a veterinary background; however, their current focus was research rather than veterinary practice. Invitations were sent to animal welfare researchers in the following countries: Canada, the United States, the United Kingdom, Germany, Denmark, the Netherlands, Australia and New Zealand. Veterinarians with an expertise in animal welfare (n = 72), who were not researchers, were selected based on their membership on veterinary association animal welfare committees in Canada or the United States: Canadian Veterinary Medical Association Animal Welfare Committee [n = 10]; American Veterinary Medical Association Animal Welfare Committee [n = 26]; American Association of Feline Practitioners Feline Welfare Committee [n = 13]; and provincial or state veterinary association welfare committees [n = 23]. Canadian and American veterinarians currently in practice were randomly selected from publically available provincial and state veterinary association membership listings (n = 875). For this last category, only veterinarians not currently affiliated with a teaching hospital or veterinary college were eligible to participate. In instances where electronic contact information was not listed, information was derived from clinic websites whenever possible. If no electronic contact information could be found, the veterinarian was excluded from participation and another veterinarian was randomly selected in their place. Our intent was to invite ten companion animal and five mixed (companion animal and any other species group) animal practitioners from each Canadian province (10) and American state (51); however, numbers were lower for certain areas due to
small population sizes and/or a lack of available electronic contact information. When mixed animal practitioners were limited, additional companion animal practitioners were invited to participate to ensure adequate geographical representation for each province and state.

Survey Development

The survey was pilot-tested on a small group of veterinarians (n = 2 clinicians and 3 graduate students) at the Ontario Veterinary College to ensure that questions would be properly interpreted by survey participants and yield relevant responses. The survey did not require modification after the pilot test.

Stage I: Determination of “What veterinary care-related factors impact welfare?”

Participants were asked to provide basic demographic information: gender; place of residence; educational and veterinary background; involvement with research; and degree of involvement in animal welfare organizations, projects, and causes. A definition of animal welfare incorporating the “three-aspects” approach [biological health and functioning; feelings or affective state; and natural living and behaviour (Fraser et al 1997)] was provided, and participants were asked which aspect(s) of this definition they incorporate into their own personal definition; this was the only question in which participants were permitted to select more than one response. Year of graduation from veterinary school, graduate training, involvement in animal welfare organizations and personal welfare definitions were compared across participant category using chi-square tests.

To gauge opinion regarding veterinary-related factors that potentially impact welfare, the following open-ended questions were asked:
i) Considering the effect of veterinary care on animal welfare, which factors do you think impact the welfare of companion animals (dogs and cats) **WHILE THEY ARE AT THE VETERINARY CLINIC**?

ii) Considering the effect of veterinary care on animal welfare, which factors do you think impact the welfare of companion animals (dogs and cats) **WITHIN THE ANIMAL’S HOME**?

Participants were provided with a free-text box and had an unlimited amount of space in which to respond.

To analyze the veterinary care-related factors, content analysis was performed, and all identified factors were organized such that overarching themes could be identified. Frequencies with which each factor was suggested, both in terms of raw counts and as a proportion of the total number of factors suggested for each location (veterinary clinic or home environment), were calculated for all participants and then for each category of participant. Exact confidence intervals at the 95% level using Sterne limits were calculated for each proportion.

*Stage II: Determination of “What is the relative impact of these factors on the animal’s welfare?”*

All factors from Stage I were included in Stage II. Factors were organized first by thematic category (e.g. physical environment, routine animal care, veterinarian-client communication) and then by the location in which they impact welfare. In addition to the factors identified by the participants, factors that were identified through a review of the scientific literature or from existing welfare assessment systems for other animal species were added to these lists. Four versions of the Stage II survey were created, each with thematic categories.
presented in a different order. In addition, for each participant’s survey, the order of factors within each category was randomized. This was done to reduce any bias that may result from the order in which factors were presented. The welfare definition used in Stage I was provided again, to serve as a reminder to participants and to allow for additional comments regarding this definition. Participants were then asked to rate the relative impact of each factor on animal welfare using a five-point ordinal scale with labeled end-points (0 = no impact, 4 = high impact). Space was provided to add any additional factors or other comments that may arise from reading other participants’ responses from the previous round (Stage I).

To analyze the relative impact of these factors on the animal’s welfare, mean impact scores were calculated for each individual factor, and compiled across all participants. Responses from an individual were included when the participant had completed at least 80% of the questions. Thus, the number of responses on which scores were based varied from factor to factor.

Mean scores were presented to broadly characterize the data. In addition, non-parametric statistical tests were performed because responses used a five-point ordinal scale and thus, did not meet the assumptions of parametric statistics. To investigate the effect of participant category on the impact scores assigned to each factor, a Kruskal-Wallis one-way ANOVA using Monte Carlo (exact) p-value estimation (100 000 permutations) was performed in SAS 9.2 (SAS Institute Inc, Cary, NC, USA). Post-hoc analysis involving multiple comparisons using Monte Carlo (exact) methods of p-value estimation (100 000 permutations) were performed to determine significant differences between pair-wise comparisons.
Stage III: Determination of “Is it practical to improve and measure each factor?”

Participants were presented with the same list of factors as in Stage II. Similar to Stage II, different versions of the survey were created, such that the order in which questions were presented varied for each participant. Participants were asked to evaluate each factor in terms of whether it could be practically improved in an everyday clinic setting (Yes; No; Don’t know) and whether it would be feasible to measure in the context of a welfare assessment scheme (Yes; No; Don’t know). Additional space was provided at the bottom of each page for comments.

For each factor, improvability and measurability scores were calculated by determining the percentage of participants who answered positively (‘Yes’) as a function of all participants who answered the question for that factor. Exact confidence intervals at the 95% level using Sterne limits were calculated for each proportion. Responses from all participants who completed at least 80% of questions were included in the calculations.

Results

The overall response rate was 7.9%, with a total of 78 individuals participating in the survey: 38 (3.8%) completed one stage; 13 (1.3%) completed two stages; and 27 (2.7%) completed all three stages. For Stages II and III, responses from 14 of 78 participants (17.9%) were excluded from analysis because they completed less than 80% of all questions in which factors were asked to be rated. Response rates amongst animal welfare researchers, veterinarians with an expertise in animal welfare, and practicing veterinarians were 25.6%, 37.5% and 4.6% respectively.
Participant Demographics

Of the 78 participants, 11 (14%) were animal welfare researchers, 27 (35%) were veterinarians with an expertise in animal welfare, and 40 (51%) were practicing veterinarians. Women accounted for 65% of all participants, men accounted for 33%, and 2% declined to answer. Participants resided in Canada (31%), the United States (54%), and the United Kingdom (9%); 5% declined to answer. As stated previously, all of the veterinarians with an expertise in animal welfare and all of the practicing veterinarians who were surveyed resided in Canada or the United States, whereas many (64%) of the animal welfare researchers resided in the United Kingdom.

Most participants (89%) were veterinarians, 6% were not veterinarians, and 5% declined to answer. Amongst veterinarians across all participant groups, 68% focused on companion animal medicine, 13% on mixed animals, and 19% were currently focused on some other form of veterinary medicine (not companion or mixed animal medicine). Amongst veterinarians, the year of graduation from veterinary school ranged from 1962 to 2007: 4% in the 1960s, 7% in the 1970s, 26% in the 1980s, 29% in the 1990s, 22% in the 2000s, and 12% that did not indicate a specific year. The distribution of decade of graduation from veterinary school was different across participant category ($\chi^2 = 25.04$, $P = 0.002$), with practicing veterinarians being more recent graduates (1977-2007), and veterinarians with an expertise in animal welfare and veterinarians who are animal welfare researchers showing a wider distribution (1962-2004 and 1960-2000, respectively; bell-shaped curve).

In terms of graduate training, 32% of all participants held a graduate degree (master’s or doctorate). All (100%) animal welfare researchers, 48% of veterinarians with an expertise in animal welfare, and 5% of practicing veterinarians completed graduate training. This
characteristic was a requirement for the selection of animal welfare researchers and as such, completion of graduate training was different across participant category ($\chi^2 = 39.12, P < 0.001$), with practicing veterinarians less likely to have a graduate degree.

In terms of involvement in animal welfare organizations, projects, and causes, 12% responded that they were not at all involved, 27% were minorly involved (i.e. interested, yet rarely actively involved), 15% were involved (i.e. organization membership), and 41% were very involved (i.e. attendance at talks, active involvement). Level of involvement differed by participant category ($\chi^2 = 29.57, P < 0.001$), with animal welfare researchers and veterinarians with an expertise in animal welfare more likely to consider themselves involved or very involved compared to practicing veterinarians, who largely considered themselves minorly or not involved.

In their personal definition of animal welfare, 90% of participants included biological health and functioning, 88% included feelings or affective state, and 83% included natural living and behaviour. The inclusion of these different aspects of animal welfare into participant’s personal definitions did not differ by participant category (all $P > 0.05$).

**Stage I: What impacts welfare?**

A total of 47 individuals participated in Stage I (response rate = 4.7%). Response rates for the three categories of participants were animal welfare researchers at 23.3% (n = 10), veterinarians with an expertise in animal welfare at 30.6% (n = 22), and practicing veterinarians at 1.7% (n = 15).
Clinic environment

In Stage I, a total of 51 factors believed to impact welfare within the veterinary clinic were listed by 36 participants. Factors could be grouped into six themes: physical environment (10 factors); medical and surgical procedures (5 factors); routine animal care (4 factors); interactions between patients, staff, and clients (13 factors); staff attitudes and education (4 factors); and clinic management (6 factors). An additional 9 factors could not be categorized (See Figure 2.1 for themes and Table 2.1 for the complete list of clinic environment factors).

Despite the open-ended nature of the questions, multiple participants suggested the same factors, thus, in Stage II, only a few additional factors were added and no additional factors were added in Stage III. Auditory stimulation (e.g. noise levels, potentially disturbing noises from other animals) was the most frequently suggested factor, mentioned by 52.8% (19/36) of all participants, followed by olfactory stimulation (44.4%; 16/36). Although each category of participants mentioned these factors, some categories suggested additional factors at a higher frequency (Table 2.2).

Home environment

For the home environment, 38 participants suggested 26 veterinary-related factors that they thought impacted welfare. Three themes emerged: medical and surgical procedures (7 factors), veterinarian-client communication (12 factors), and staff attitudes and education (3 factors); 4 factors could not be categorized (see Figure 2.1 for themes and Table 2.3 for complete list of home environment factors).

The three most commonly cited factors were veterinarian-client communication concerning basic animal needs (52.6%; 20/38), preventive care (44.7%; 17/38), and socialization,
training and handling (39.5%; 15/38). When divided by participant category, veterinarians and 
veterinarians with an expertise in animal welfare were consistent in their responses, while animal 
welfare researchers, on the other hand, suggested a wide variety of factors (see Table 2.4).

**Stage II: Relative impact on welfare**

Upon completion of the analysis of the Stage I responses, six additional factors pertaining 
to welfare in the clinic environment and two additional factors related to the home environment 
were added to the list based on a review of the scientific literature or from existing welfare 
assessment systems for other species (identified by asterisks in Table 2.1). Thus, 57 factors 
related to the clinic and 28 to the home environment were used in Stage II and Stage III.

A total of 52 individuals (5.3% overall response rate) participated in Stage II of 
consultation; 31 of these had completed the previous stage and 21 were new participants, thus 
66% of Stage I participants completed Stage II. Response rates according to participant category 
were: 18.6% for animal welfare researchers (n = 8); 33.3% for veterinarians with an expertise in 
animal welfare (n = 24); and 2.3% for veterinarians (n = 20).

Clinic environment

Mean relative impact scores (RIS) for factors associated with the clinic environment 
ranged from 1.0 to 3.8 (on a five-point scale: 0-4), where a higher score indicates a perceived 
higher impact (see Table 2.1). Approximately 65% (37/57) of factors were assigned a score of 3 
or higher, with 10 factors allotted an average RIS of 3.5 or greater. The ability to recognize, 
evaluate and interpret species-specific animal behaviours and the optimization of analgesic 
regimes were deemed to have the largest impact on companion animal welfare in the clinic.
setting. Conversely, restricted ability to reproduce during the time spent in clinic and the use of alternative medicine and alternative medical diagnosis were deemed to have the lowest impact, each receiving a mean RIS below 2.

For a number of factors, impact scores differed by participant category. Animal welfare researchers rated ventilation and air quality as having a significantly lower impact on animal welfare (mean = 2.38) than veterinarians (mean = 3.30, $P = 0.026$) and veterinarians with an expertise in animal welfare (mean = 3.38, $P = 0.011$). Similarly, animal welfare researchers rated client emotion as having a significantly lower impact on patient welfare (mean = 2.50) than did veterinarians (mean = 3.26, $P = 0.014$) and veterinarians with an expertise in animal welfare (mean = 3.25, $P = 0.017$). Veterinarians rated separation from owner and other conspecifics (mean = 2.50) lower than veterinarians with an expertise in animal welfare (mean = 3.00, $P = 0.033$) and animal welfare experts (mean = 3.50, $P = 0.006$). Veterinarians also rated the animal’s lack of sense of control as having a significantly lower impact (mean = 2.40) than veterinarians with an expertise in animal welfare (mean = 3.25, $P = 0.001$) and animal welfare researchers (mean = 3.25, $P = 0.020$). For all other factors, impact scores did not differ significantly (all $P > 0.05$) according to the category of participant.

Home environment

The range in RIS for veterinary-related factors that are thought to affect welfare in the home environment was smaller than that for the clinic environment, ranging from 2.4 to 3.8. Only 5 factors (18%) were assigned a score below 3, with the availability of pre-breeding counselling, the personification of animals, and reintroduction to the home after a clinic visit considered to have the lowest relative impact on welfare, whereas 10 factors (36%) scored above
3.5 (see Table 2.3). Post-surgical and chronic pain control, communication regarding appropriate socialization, handling and training, and communication with clients regarding their animal’s basic needs (e.g. exercise requirements) were thought to most greatly impact the welfare of companion animals in their home environment.

Animal welfare researchers rated the communication of information regarding basic animal behaviour (mean = 2.88) lower than both veterinarians (mean = 3.70, P = 0.004) and veterinarians with an expertise in animal welfare (mean = 3.58, P = 0.023). With reference to the impact of communicating information regarding veterinary preventive care, veterinarians (mean = 3.75) rated its impact on animal welfare as higher than animal welfare researchers (mean = 3.00, P = 0.007). Finally, veterinarians assigned a lower impact score (mean = 3.16) for the veterinary clinic staff’s ability and willingness to answer questions than did veterinarians with an expertise in animal welfare (mean = 3.67; P = 0.015).

Stage III: Improvability and measurability of factors affecting welfare

With 44 participants, the overall response rate for Stage III was 4.4%; 10 of these participants had not completed the previous stages, thus 77% had participated in at least one previous stage and 62% of those who participated in Stage II completed this stage. Response rates were highest amongst veterinarians with an expertise in animal welfare (23.4%, 19 participants), followed by animal welfare researchers (11.6%, 5 participants), and veterinarians (2.3%; 20 participants).

Improvability

Improvability scores ranged from 14 to 100%; however, the median improvability scores for factors within the clinic (90%) and home (90%) environments were towards the upper end of
the range (Table 2.1). All participants agreed that six in-clinic factors could be improved: 1) ability to recognize, evaluate and interpret species-specific animal behaviours (e.g. pain, fear); 2) knowledge, understanding and use of positive reinforcement, pre-training, food rewards/treats, and species-specific handling techniques; 3) on-going staff training and continuing education; 4) explanation of actions and procedures throughout exams; 5) the provision of easily accessible necessities in housing units; 6) surface traction. Additionally, with respect to welfare in the home environment, 100% of participants thought that clinic staff’s ability and willingness to answer questions and provide information could be improved. Overall, at least 80% of participants thought a total of 57 factors (67%) were improvable, including 36 (63%) in-clinic factors and 21 (75%) home factors. Sixty per cent of participants thought that almost all of the factors (79 factors; 93%) were improvable.

Measurability

Measurability scores ranged from 21 to 95% across all factors, whereas the medians for both clinic factors (71%) and home environment factors (63%) were towards the upper end of the range (Table 2.1). No factors were considered measurable by all the participants; however, 23 (27%) factors were considered measurable by at least 80% of participants and 57 (67%) were considered measurable by at least 60%. As a whole, factors related to the clinic environment were generally thought to be more easily measured (n = 19; 33% with at least 80% of participants in agreement) than veterinary-related factors in the home environment (n = 4 factors; 14% with > 80% agreement).
Discussion

Through a multi-stage survey, a total of 85 veterinary care-related factors were suggested to impact canine and feline welfare. Thus, there is a general opinion that many aspects of veterinary care impact patient welfare. These responses encompass a variety of themes and relate both to short-term effects, while the animal is in the veterinary clinic, and long-term consequences after the animal leaves the clinic and returns home with its owner. The majority of these factors received an average impact score of at least 3 out of a maximum score of 4, suggesting that most factors are believed to have a moderate to high impact on animal welfare. Factors considered to have the highest impact across both the clinic and home environment were post-surgical and chronic pain control, the optimization of analgesic regimes within the clinic, and the veterinary staff members’ ability to recognize and interpret species-specific animal behaviours.

Although the overall range in scores related to the potential for improvement of each factor was large, medians for both the clinic and home environments were in the high end of the range (90% for both), with 93% of all factors considered to be improvable by at least 60% of participants. Thus, most factors were widely considered to be practical to improve. In terms of their ability to be measured, more than half (67%) of the factors were considered to be measurable by at least 60% of participants. Factors related to the home environment were generally thought to be less measurable than those in the clinic environment. This is likely due to the more abstract nature of the home factors and the greater practicality of assessing the clinic factors. For instance, the methodology required to measure factors related to the physical environment, such as whether hospitalized patients are provided with necessities like food and
water, may be more obvious than that which would be required to measure the communication of various topics related to home care or the attitudes of staff members.

The type of participant appears to have affected responses. In Stage I, many factors were suggested at a high overall frequency, such as auditory and olfactory stimulation. When the category of participant was considered; however, the most commonly suggested factors differed. For example, many veterinarians mentioned physical restraint whereas animal welfare researchers more frequently suggested theoretical concepts, such as patient separation from its owner and other conspecifics and the clinic as a novel space. In Stage II, significant differences in the average perceived impact of several factors also occurred according to participant type. Welfare researchers focused on more abstract concepts, such as animal separation from owner and a lack of a sense of control, whereas veterinarians considered more tangible aspects such as client emotional state and communication of information regarding veterinary preventive care to have a higher impact on patient welfare. Overall, differences in responses are likely due to differences in the current career focus of the participants in each category. Veterinarians and veterinarians with an expertise in animal welfare answered the questions from a veterinary practice viewpoint. These individuals recognized patient welfare issues that they encounter on a daily basis. These participants may have also focused on factors that they believed they had control over in the clinic setting. Moreover, restraint and handling have become increasingly important topics within the veterinary community. For instance, the American Association of Feline Practitioners has published cat-friendly handling guidelines (Rodan et al 2011) whereas others have written about low-stress handling techniques (Yin 2009). Although many animal welfare researchers had a veterinary background, their current primary focus was research. These individuals may not be aware of practical everyday challenges in the clinic, possibly resulting in

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the researchers taking a more theoretical stance when ranking the importance of different factors. Animal welfare researchers were also mostly located in the United Kingdom, where welfare legislation is more extensive and animal welfare may be perceived differently than in Canada and the United States.

In Stage II and III, scores for relative impact, improvability and measurability tended to be high for most factors. As an example, in Stage II, only 25 factors (29% of 85 factors) were thought to have an impact below three out of a maximum score of four. Similarly, in Stage III, median improvability scores and measurability scores were towards the higher end of the range. Despite this, certain factors consistently received low scores (e.g. limited reproduction while in the clinic was considered to have a low impact and the lack of sense of control was deemed impractical to measure). Because all factors were presented in random order within each theme, the scores corresponding to these ‘outlier’ factors serve as a quality control. Thus, the fact that these factors consistently scored lower validates that participants were thinking critically about individual factors rather than simply selecting all responses within a particular column.

Initial response rates for Stage I were low (4.4%); however, 66% of those who participated in Stage I also responded in Stage II and 77% of the Stage III participants had previously responded to either I or II or both. Animal welfare researchers responded at between 12 and 23% across all three stages, whereas veterinarians with an expertise in animal welfare responded at approximately 30%. These rates are in line with similar previous multi-stage survey studies; for example, Whay et al (2003) noted a response rate of 22% in their two-stage consultation with experts to investigate measures appropriate for the assessment of the welfare of agricultural animals. Response rates amongst veterinarians, on the other hand, were around 2% across all stages. Unlike the situation for the other participant groups, personal email addresses
were not available for many veterinarians and invitations were often sent to clinic email addresses. As such, it is unclear what proportion of these invitations actually reached their intended recipient, and this may have contributed to the lower levels of participation amongst this group. Retention of veterinarians from Stage I to II was 33%; having completed the initial stage, these individuals certainly received our invitations and retention rate may thus be a less biased figure than overall response rate. Veterinarians were also selected at random from the whole population of publically listed veterinarians in Canada and the United States and thus the response rate was expected to be low.

This study may have been subject to particular biases because of the methods used. Only electronic invitations were sent, thus individuals who do not have an electronic mailing address or for which an electronic mailing address could not be found did not have the opportunity to participate. Similarly, only an electronic version of the survey was made available to participants. Moreover, animal welfare researchers and veterinarians with an expertise in animal welfare were identified based on their interest and expertise in animal welfare. In contrast, veterinarian sampling was random and thus veterinarians who were not interested in animal welfare may have felt less inclined to participate. This possibility is somewhat reflected in participants’ self-rated degree of involvement in animal welfare organizations, projects and causes, although 39% of all participants and 72% of veterinarians considered themselves to be only minorly or not involved.

This study was explorative and aimed to gauge opinions from a diverse group of individuals, representing an assortment of backgrounds and current occupations, with the objective of investigating welfare issues related to veterinary care. Although volunteer bias is often a limitation in survey-based research, and response rates were low overall, demographic
information suggests that participants ranged widely in terms of clinical and research experience, veterinary specialization and advanced education, geographical representation, age, and involvement in animal welfare causes and organizations. Although participants may not be entirely representative of the larger study population’s opinions, responses from Stage I ceased to yield novel information, suggesting that theoretical saturation may have been reached nonetheless. For Stages II and III, however, rankings are likely not representative of all practicing veterinarians.

When assessing welfare, it is important to consider a balance between the strength of impact and the practicality of improvement. High impact factors may not all be easily improved, (e.g. examining an animal out of their familiar environment at the veterinary clinic) yet it may be relatively easy to change lower ranked factors. With a goal of continuous improvement, there is still a benefit to improving these lower ranked factors. Additionally, as a prerequisite to quantifying improvement, factors should also be practical to measure. As a whole, most factors identified here could lend themselves to one of the three types of measures typically seen when assessing animal welfare: resource-based measures (e.g. cage furnishings), management-based measures (e.g. on-going staff training and continuing education), and animal-based measures (e.g. post-surgical and chronic pain control; Johnsen et al 2001). For instance, Welfare Quality® uses primarily animal-based measures such as body condition scoring and approach avoidance testing to assess the welfare of pigs, cattle and poultry, whereas the Animal Needs Index (TGI-35L) in Austria mainly focuses on resource-based measures such as floor condition and space allocation to assess welfare on the same species (Bartussek 1999, Blokhuis et al 2010). Because factors suggested here are translatable into the types of measures currently used in welfare assessment systems for other species, these results have the potential to act as the foundation of a
similar assessment system for the veterinary clinic environment. For instance, aspects of the physical environment such as the provision of necessities in cages and surface traction throughout the clinic could be assessed by performing a site tour, and veterinarian-client communication of welfare-related topics could be assessed by reviewing written brochures available to clients and video recording appointments for discussion analysis.

This research is a first step towards understanding the veterinary care-related factors that may influence the welfare of companion animals; however, further studies are required to confirm the validity of individual factors. Specifically, it is important to scientifically assess whether each factor has a quantifiable impact on welfare. Nevertheless, participants included individuals who work closely with animals in a veterinary care capacity and/or have a strong background in animal welfare and are thus authorities in the subject matter. Many factors were also repeatedly listed by multiple participants even though the survey was independently completed, suggesting a degree of consensus.

**Animal welfare implications**

Overall, the current results identify numerous factors that have the potential to influence the welfare of companion animals in relation to veterinary care. This provides a framework for determining appropriate areas for future research, with information regarding perceived impact and the practicality of improvement and measurement highlighting specific areas deserving priority investigation. For example, the ability to recognize species-specific behaviours such as fear and pain, as well as the optimization of pain control for both acute and chronic pain were considered to have the largest impact on animal welfare, and should thus be an area of focus for future research. Results may also have an application as the basis for the development of a
welfare assessment tool for companion animals in the veterinary clinic environment, similar to those that have been extensively developed for agricultural species in farm settings.
References

American Veterinary Medical Association. 2007. U.S. pet ownership and demographic sourcebook. American Veterinary Medical Association: Schaumburg, IL, USA.


Rodan, I. 2010. Understanding feline behavior and application for appropriate handling and management. Topics in Companion Animal Medicine, 25(4), 178-188.


Figure 2.1: Concept map outlining themes from Stage I of consultation regarding veterinary-related factors believed to impact companion animal welfare. Numbers in brackets reflect the number of factors within each theme. An additional 13 factors could not be categorized into themes.
Table 2.1: Veterinary clinic environment: factors believed to affect animal welfare in the veterinary clinic environment, arranged according to theme. Each factor is listed with their perceived mean relative impact score (RIS), improvability score (% agreement), and measurability score (% agreement). Factors identified through literature searches rather than by survey participants are identified with an asterisk.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Factor</th>
<th>Mean RIS (4)</th>
<th>Improvable (% Y)</th>
<th>95% CI</th>
<th>Measurability (% Y)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Species-specific practice adaptations</td>
<td>3.3</td>
<td>71%</td>
<td>55-83%</td>
<td>66%</td>
<td>49-80%</td>
</tr>
<tr>
<td>CM</td>
<td>Clear communication amongst all staff members</td>
<td>3.3</td>
<td>97%</td>
<td>86-100%</td>
<td>68%</td>
<td>51-82%</td>
</tr>
<tr>
<td>CM</td>
<td>Established, written protocols and procedures and staff familiarity with these protocols and procedures</td>
<td>3.3</td>
<td>97%</td>
<td>86-100%</td>
<td>92%</td>
<td>79-98%</td>
</tr>
<tr>
<td>CM</td>
<td>Availability of financial payment plans</td>
<td>3.0</td>
<td>66%</td>
<td>49-79%</td>
<td>79%</td>
<td>63-90%</td>
</tr>
<tr>
<td>CM</td>
<td>Clinic focus: high volume vs. client-centered*</td>
<td>2.9</td>
<td>74%</td>
<td>58-86%</td>
<td>66%</td>
<td>49-79%</td>
</tr>
<tr>
<td>CM</td>
<td>Staff size and efficiency</td>
<td>2.9</td>
<td>84%</td>
<td>69-93%</td>
<td>95%</td>
<td>82-99%</td>
</tr>
<tr>
<td>CM</td>
<td>Time allotted for each appointment (appointment length)</td>
<td>2.7</td>
<td>82%</td>
<td>66-91%</td>
<td>87%</td>
<td>72-95%</td>
</tr>
<tr>
<td>PE</td>
<td>Provision of easily accessible necessities (e.g. food, water, litter box)*</td>
<td>3.7</td>
<td>100%</td>
<td>91-100%</td>
<td>92%</td>
<td>79-98%</td>
</tr>
<tr>
<td>PE</td>
<td>Space allowance appropriate for medical treatment, considering need for observation, injury prevention</td>
<td>3.5</td>
<td>92%</td>
<td>79-98%</td>
<td>87%</td>
<td>73-95%</td>
</tr>
<tr>
<td>PE</td>
<td>Cage furnishings appropriate for medical treatment, considering need for observation, injury prevention</td>
<td>3.5</td>
<td>92%</td>
<td>79-98%</td>
<td>82%</td>
<td>66-91%</td>
</tr>
<tr>
<td>PE</td>
<td>Thermal comfort: temperature, humidity</td>
<td>3.4</td>
<td>97%</td>
<td>86-100%</td>
<td>90%</td>
<td>75-96%</td>
</tr>
<tr>
<td>PE</td>
<td>Auditory stimulation</td>
<td>3.4</td>
<td>84%</td>
<td>69-93%</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>PE</td>
<td>Ventilation and air quality*</td>
<td>3.2</td>
<td>90%</td>
<td>75-96%</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>PE</td>
<td>Surface traction (e.g. exam table, clinic floors)</td>
<td>3.2</td>
<td>100%</td>
<td>91-100%</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>PE</td>
<td>Olfactory stimulation</td>
<td>3.1</td>
<td>82%</td>
<td>66-91%</td>
<td>55%</td>
<td>40-70%</td>
</tr>
<tr>
<td>PE</td>
<td>Physical, visual separation of animals</td>
<td>2.9</td>
<td>90%</td>
<td>75-96%</td>
<td>79%</td>
<td>63-90%</td>
</tr>
<tr>
<td>PE</td>
<td>General cleanliness of clinic, all surfaces</td>
<td>2.8</td>
<td>97%</td>
<td>86-100%</td>
<td>90%</td>
<td>75-96%</td>
</tr>
<tr>
<td>PE</td>
<td>Special consideration for euthanasia, special cases</td>
<td>2.8</td>
<td>90%</td>
<td>75-96%</td>
<td>81%</td>
<td>65-91%</td>
</tr>
<tr>
<td>PE</td>
<td>Lighting: level, composition</td>
<td>2.7</td>
<td>90%</td>
<td>75-96%</td>
<td>82%</td>
<td>66-91%</td>
</tr>
<tr>
<td>RAC</td>
<td>Provision and nature of positive human interactions, where appropriate</td>
<td>3.4</td>
<td>87%</td>
<td>73-95%</td>
<td>63%</td>
<td>47-77%</td>
</tr>
<tr>
<td>RAC</td>
<td>Appropriate light/dark phases</td>
<td>2.9</td>
<td>73%</td>
<td>57-86%</td>
<td>60%</td>
<td>43-75%</td>
</tr>
<tr>
<td>RAC</td>
<td>Provision of playtime/outdoor access/time outside cage, where appropriate</td>
<td>2.8</td>
<td>78%</td>
<td>62-90%</td>
<td>70%</td>
<td>54-83%</td>
</tr>
<tr>
<td>RAC</td>
<td>Change in routine from home environment</td>
<td>2.7</td>
<td>66%</td>
<td>49-79%</td>
<td>53%</td>
<td>37-69%</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------</td>
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<td>-----</td>
<td>--------</td>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td>I</td>
<td>Staff adapts, changes behaviour and approach in response to animal’s reaction</td>
<td>3.7</td>
<td>97%</td>
<td>86-100%</td>
<td>71%</td>
<td>55-83%</td>
</tr>
<tr>
<td>I</td>
<td>Physical restraint</td>
<td>3.6</td>
<td>92%</td>
<td>79-98%</td>
<td>74%</td>
<td>58-86%</td>
</tr>
<tr>
<td>I</td>
<td>Social stress: presence/sight of aggressive animals</td>
<td>3.5</td>
<td>76%</td>
<td>60-87%</td>
<td>54%</td>
<td>38-69%</td>
</tr>
<tr>
<td>I</td>
<td>‘Vet fear’: unfamiliar people, unfamiliar manipulations</td>
<td>3.4</td>
<td>68%</td>
<td>51-82%</td>
<td>55%</td>
<td>40-71%</td>
</tr>
<tr>
<td>I</td>
<td>Use of positive reinforcement to reduce fear</td>
<td>3.4</td>
<td>97%</td>
<td>86-100%</td>
<td>74%</td>
<td>58-86%</td>
</tr>
<tr>
<td>I</td>
<td>Vocal tones used by staff</td>
<td>3.3</td>
<td>92%</td>
<td>79-98%</td>
<td>54%</td>
<td>38-69%</td>
</tr>
<tr>
<td>I</td>
<td>Staff asks appropriate questions about animal’s behaviour and welfare</td>
<td>3.3</td>
<td>92%</td>
<td>79-98%</td>
<td>71%</td>
<td>55-83%</td>
</tr>
<tr>
<td>I</td>
<td>Staff allows patient time to acclimate to environment, staff prior to attempting any interaction</td>
<td>3.3</td>
<td>71%</td>
<td>55-83%</td>
<td>65%</td>
<td>49-79%</td>
</tr>
<tr>
<td>I</td>
<td>Presence, proximity and/or interactions with other animals in clinic and clinic surroundings</td>
<td>3.2</td>
<td>81%</td>
<td>65-91%</td>
<td>60%</td>
<td>43-75%</td>
</tr>
<tr>
<td>I</td>
<td>Staff ensures that client feels comfortable asking and answering questions, presenting concerns</td>
<td>3.2</td>
<td>92%</td>
<td>79-98%</td>
<td>68%</td>
<td>51-82%</td>
</tr>
<tr>
<td>I</td>
<td>Client emotion (e.g. sad, stressed)</td>
<td>3.1</td>
<td>60%</td>
<td>43-75%</td>
<td>32%</td>
<td>18-49%</td>
</tr>
<tr>
<td>I</td>
<td>Staff encourages client to socialize patient to clinic*</td>
<td>3.0</td>
<td>92%</td>
<td>79-98%</td>
<td>79%</td>
<td>63-90%</td>
</tr>
<tr>
<td>I</td>
<td>Restraint during travel to clinic, while waiting (e.g. in carrier)</td>
<td>3.0</td>
<td>66%</td>
<td>49-79%</td>
<td>53%</td>
<td>37-69%</td>
</tr>
<tr>
<td>I</td>
<td>Explanation of actions, procedures throughout exams</td>
<td>2.8</td>
<td>100%</td>
<td>91-100%</td>
<td>79%</td>
<td>63-90%</td>
</tr>
<tr>
<td>MSP</td>
<td>Optimization of analgesic regimes</td>
<td>3.8</td>
<td>97%</td>
<td>86-100%</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>MSP</td>
<td>Use of anaesthetic for surgeries, minor procedures*</td>
<td>3.7</td>
<td>97%</td>
<td>86-100%</td>
<td>92%</td>
<td>79-98%</td>
</tr>
<tr>
<td>MSP</td>
<td>Use of sedatives/anxiolytics, calming agents as needed and where appropriate</td>
<td>3.2</td>
<td>92%</td>
<td>79-98%</td>
<td>68%</td>
<td>51-82%</td>
</tr>
<tr>
<td>MSP</td>
<td>Use of diverse handling and medicating techniques</td>
<td>3.2</td>
<td>97%</td>
<td>86-100%</td>
<td>82%</td>
<td>66-91%</td>
</tr>
<tr>
<td>MSP</td>
<td>Illness or other adverse effects (malaise, itch) induced by examination and medical treatment</td>
<td>3.0</td>
<td>66%</td>
<td>49-79%</td>
<td>50%</td>
<td>34-66%</td>
</tr>
<tr>
<td>MSP</td>
<td>Prior training (at home) for medical exam, treatment, any post-procedural restrictions</td>
<td>3.0</td>
<td>71%</td>
<td>55-83%</td>
<td>53%</td>
<td>37-69%</td>
</tr>
<tr>
<td>SAE</td>
<td>Ability to recognize, evaluate and interpret species-specific animal behaviours (e.g. pain, fear)</td>
<td>3.8</td>
<td>100%</td>
<td>91-100%</td>
<td>82%</td>
<td>66-91%</td>
</tr>
<tr>
<td>SAE</td>
<td>Staff experience*</td>
<td>3.6</td>
<td>82%</td>
<td>66-91%</td>
<td>74%</td>
<td>58-86%</td>
</tr>
<tr>
<td>SAE</td>
<td>Knowledge, understanding and use of positive reinforcement, species-specific handling techniques</td>
<td>3.5</td>
<td>100%</td>
<td>91-100%</td>
<td>84%</td>
<td>68-93%</td>
</tr>
<tr>
<td>SAE</td>
<td>Staff demeanour (e.g. patient, non-threatening, compassionate)</td>
<td>3.5</td>
<td>92%</td>
<td>79-98%</td>
<td>62%</td>
<td>46-77%</td>
</tr>
<tr>
<td>SAE</td>
<td>Ongoing staff training and continuing education</td>
<td>3.4</td>
<td>100%</td>
<td>91-100%</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>O</td>
<td>Health state of patient: nature of disease, duration of treatment, feelings of illness (nausea, malaise)</td>
<td>3.5</td>
<td>71%</td>
<td>54-85%</td>
<td>50%</td>
<td>34-66%</td>
</tr>
<tr>
<td>O</td>
<td>Past clinic experiences (either positive or negative)</td>
<td>3.2</td>
<td>63%</td>
<td>47-77%</td>
<td>37%</td>
<td>23-53%</td>
</tr>
<tr>
<td>O</td>
<td>Visitation for owners of hospitalized patients</td>
<td>3.0</td>
<td>90%</td>
<td>75-96%</td>
<td>76%</td>
<td>61-87%</td>
</tr>
<tr>
<td>O</td>
<td>(Lack of) sense of control: over self, preferred environment, escape</td>
<td>2.9</td>
<td>45%</td>
<td>30-61%</td>
<td>21%</td>
<td>10-37%</td>
</tr>
<tr>
<td>O</td>
<td>Separation from owner, other con specifics during treatment, isolation for disease control</td>
<td>2.9</td>
<td>61%</td>
<td>44-75%</td>
<td>50%</td>
<td>34-66%</td>
</tr>
<tr>
<td>O</td>
<td>Novel spaces: unfamiliar objects, unknown escape routes, different fixtures</td>
<td>2.6</td>
<td>48%</td>
<td>31-63%</td>
<td>41%</td>
<td>25-57%</td>
</tr>
<tr>
<td>O</td>
<td>Clinic availability, proximity: affects travel time from home to clinic</td>
<td>2.2</td>
<td>29%</td>
<td>17-45%</td>
<td>47%</td>
<td>32-64%</td>
</tr>
<tr>
<td>O</td>
<td>Use of alternative medicine, alternative medical diagnosis</td>
<td>1.8</td>
<td>42%</td>
<td>27-58%</td>
<td>53%</td>
<td>37-69%</td>
</tr>
<tr>
<td>O</td>
<td>Reproduction limited (during time in clinic)</td>
<td>1.0</td>
<td>14%</td>
<td>6-28%</td>
<td>24%</td>
<td>13-39%</td>
</tr>
</tbody>
</table>

CM = clinic management  
PE = physical environment  
RAC = routine animal care  
I = patient/staff/client interactions  
MSP = medical and surgical procedures  
SAE = staff attitudes and education  
O = other
Table 2.2: Veterinary clinic environment: most frequently suggested factors from Stage I that are believed to impact companion animal welfare (in descending order) within the clinic environment according to participant type. Exact confidence intervals (95%) for each proportion are presented in brackets.

<table>
<thead>
<tr>
<th>All participants (n = 36)</th>
<th>AWR (n = 7)</th>
<th>VE (n = 15)</th>
<th>V (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auditory stimulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19/36 = 52.8%</td>
<td>Olfactory stimulation</td>
<td>8/15 = 53.3%</td>
<td>8/14 = 57.1%</td>
</tr>
<tr>
<td>(35.9-68.3%)</td>
<td>5/7 = 71.4%</td>
<td>(29.4-77.8%)</td>
<td>(31.7-79.4%)</td>
</tr>
<tr>
<td><strong>Olfactory stimulation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16/36 = 44.4%</td>
<td>Separation from owner, other conspecifics</td>
<td>6/15 = 40%</td>
<td>7/14 = 50.0%</td>
</tr>
<tr>
<td>(29.0-61.2%)</td>
<td>5/7 = 71.4%</td>
<td>(19.1-66.8%)</td>
<td>(23.8-76.2%)</td>
</tr>
<tr>
<td><strong>Optimization of analgesic regimes</strong></td>
<td>Novel space</td>
<td>Physical, visual and/or temporal separation of patients</td>
<td>Olfactory stimulation</td>
</tr>
<tr>
<td>12/36 = 33.3%</td>
<td>5/7 = 71.4%</td>
<td>5/15 = 33.3%</td>
<td>7/14 = 50.0%</td>
</tr>
<tr>
<td>(19.0-50.0%)</td>
<td>(34.1-94.7%)</td>
<td>(14.2-60.3%)</td>
<td>(23.8-76.2%)</td>
</tr>
<tr>
<td><strong>Patient-patient interactions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/36 = 33.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19.0-50.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n = number of participants
AWR = animal welfare researcher
VE = veterinarian with an expertise in animal welfare
V = veterinarian
<table>
<thead>
<tr>
<th>Theme</th>
<th>Factor</th>
<th>Mean RIS (4)</th>
<th>Improvable (% Y) (95% CI)</th>
<th>Measurable (% Y) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSP</td>
<td>Post-surgical/chronic pain control</td>
<td>3.8</td>
<td>97% 86-100%</td>
<td>84% 69-93%</td>
</tr>
<tr>
<td>MSP</td>
<td>Complications and side effects of therapies</td>
<td>3.3</td>
<td>79% 63-90%</td>
<td>73% 57-86%</td>
</tr>
<tr>
<td>MSP</td>
<td>Proper follow-up</td>
<td>3.3</td>
<td>90% 75-96%</td>
<td>70% 54-83%</td>
</tr>
<tr>
<td>MSP</td>
<td>Individualized post-procedural recommendations</td>
<td>3.2</td>
<td>87% 73-95%</td>
<td>45% 30-61%</td>
</tr>
<tr>
<td>MSP</td>
<td>Pre-training at home for medical requirements, physical examination</td>
<td>3.0</td>
<td>84% 69-93%</td>
<td>54% 38-69%</td>
</tr>
<tr>
<td>MSP</td>
<td>Distress associated with medicating, invasiveness of post-procedure recommendations</td>
<td>2.9</td>
<td>90% 75-96%</td>
<td>63% 47-77%</td>
</tr>
<tr>
<td>SAE</td>
<td>Staff knowledge, understanding of animal behaviour, behavioural problems</td>
<td>3.6</td>
<td>97% 86-100%</td>
<td>76% 60-87%</td>
</tr>
<tr>
<td>SAE</td>
<td>Staff ability and willingness to answer questions and provide information</td>
<td>3.4</td>
<td>100% 91-100%</td>
<td>79% 63-90%</td>
</tr>
<tr>
<td>SAE</td>
<td>Staff assumptions concerning client’s knowledge base</td>
<td>3.0</td>
<td>90% 75-96%</td>
<td>57% 41-72%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: appropriate socialization, training, handling</td>
<td>3.7</td>
<td>95% 82-99%</td>
<td>68% 51-82%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: animal needs</td>
<td>3.6</td>
<td>95% 82-99%</td>
<td>75% 58-87%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: judging quality of life &amp; signs of declining health</td>
<td>3.6</td>
<td>95% 82-99%</td>
<td>54% 38-69%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: basic animal behaviour</td>
<td>3.5</td>
<td>95% 82-99%</td>
<td>81% 64-91%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: veterinary preventive care</td>
<td>3.5</td>
<td>97% 86-100%</td>
<td>84% 69-93%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: end of life issues, euthanasia</td>
<td>3.4</td>
<td>95% 82-99%</td>
<td>63% 47-77%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: basic daily care</td>
<td>3.4</td>
<td>97% 86-100%</td>
<td>81% 65-91%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: companionship from human and non-human sources</td>
<td>3.3</td>
<td>84% 69-93%</td>
<td>58% 42-73%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: controversial procedures, unnecessary surgery (e.g. cosmetic procedures)</td>
<td>3.1</td>
<td>97% 86-100%</td>
<td>73% 57-86%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: appropriate sources of information</td>
<td>3.1</td>
<td>86% 72-95%</td>
<td>60% 43-75%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: availability of pre-purchase counselling*</td>
<td>3.0</td>
<td>76% 61-87%</td>
<td>49% 32-65%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: impact of unhealthy owner habits, cleanliness and ventilation of home</td>
<td>2.9</td>
<td>63% 47-77%</td>
<td>32% 19-49%</td>
</tr>
<tr>
<td>VCC</td>
<td>Communication: transmissible, infectious, zoonotic disease</td>
<td>2.8</td>
<td>92% 79-98%</td>
<td>73% 57-86%</td>
</tr>
<tr>
<td></td>
<td>VCC Communication: availability of pre-breeding counselling*</td>
<td>2.5</td>
<td>84%</td>
<td>69-93%</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td>O</td>
<td>Chronic illness/medication and client reluctance to euthanize</td>
<td>3.6</td>
<td>76%</td>
<td>61-87%</td>
</tr>
<tr>
<td>O</td>
<td>Owner’s acceptance of and compliance with veterinarian’s advice and suggestions</td>
<td>3.4</td>
<td>76%</td>
<td>61-87%</td>
</tr>
<tr>
<td>O</td>
<td>Personification of animals</td>
<td>2.8</td>
<td>40%</td>
<td>25-56%</td>
</tr>
<tr>
<td>O</td>
<td>Reintroduction issues</td>
<td>2.4</td>
<td>61%</td>
<td>44-75%</td>
</tr>
</tbody>
</table>

MSP = medical and surgical procedures  
SAE = staff attitudes and education  
VCC = veterinarian-client communication  
O = other.
Table 2.4: Home environment: most frequently suggested veterinary-related factors from Stage I that are believed to impact companion animal welfare within the home environment according to participant type. Exact confidence intervals (95%) for each proportion are presented in brackets.

<table>
<thead>
<tr>
<th>Factor</th>
<th>All participants (n = 38)</th>
<th>AWR (n = 7)</th>
<th>VE (n = 15)</th>
<th>V (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication: basic animal needs</td>
<td>Communication: basic animal needs</td>
<td>20/38 = 52.6%</td>
<td>2/7 = 28.6%</td>
<td>7/15 = 46.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(36.7-68.7%)</td>
<td>(5.3-65.9%)</td>
<td>(22.2-70.6%)</td>
</tr>
<tr>
<td>Communication: preventive care</td>
<td>Individualized recommendations</td>
<td>17/38 = 44.7%</td>
<td>2/7 = 28.6%</td>
<td>6/15 = 40.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(29.6-60.6%)</td>
<td>(5.3-65.9%)</td>
<td>(19.1-66.8%)</td>
</tr>
<tr>
<td>Communication: socialization, training, handling</td>
<td>Distress associated with medicating</td>
<td>15/38 = 39.5%</td>
<td>2/7 = 28.6%</td>
<td>6/15 = 40.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(24.7-55.7%)</td>
<td>(5.3-65.9%)</td>
<td>(19.1-66.8%)</td>
</tr>
<tr>
<td></td>
<td>Postoperative movement restrictions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2/7 = 28.6%</td>
<td>(5.3-65.9%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Client compliance with veterinarian’s advice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2/7 = 28.6%</td>
<td>(5.3-65.9%)</td>
<td></td>
</tr>
</tbody>
</table>

n = number of participants
AWR = animal welfare researcher
VE = veterinarian with an expertise in animal welfare
V = veterinarian
CHAPTER THREE

An assessment of the communication of animal welfare-related information by veterinarians and veterinary technicians in companion animal veterinary practice

Abstract

Veterinary clinic staff-client communication of information concerning animal care and welfare has the potential to substantially impact the welfare of dogs and cats in their home environment. To both evaluate and promote the provision of key welfare-related information to pet owners in veterinary practice, an animal welfare assessment tool using management-based measures and incorporating questionnaires, verbal interviews and observations of veterinary appointments, was developed. This tool was evaluated for reliability, validity and feasibility in 30 companion and mixed animal veterinary clinics in southern Ontario, Canada. According to weighted kappa statistics, inter-observer reliability (two inexperienced, trained observers vs. one experienced observer) was greatest for the scoring of questionnaires ($K_w = 0.86$ and $0.93$), followed by veterinary appointment observation ($K_w = 0.61$ and $0.64$), and interviews ($K_w = 0.40$ and $0.44$); intra-observer reliability (one experienced observer over two occasions) was high ($K_w \geq 0.80$) across all three assessment formats. Questionnaires and interviews showed high feasibility for ease of use in practice; however, the level of discussion about particular topics observed during veterinary appointments was lower than that reported by veterinarians through questionnaire and interview responses, suggesting that these methods might have low validity. Overall, with the exception of veterinary preventive care, a number of topics (e.g. appropriate training methods, animal behaviour and behaviour issues, chronic pain) appear to be routinely and proactively discussed at low frequencies. Thus, results suggest that the provision of
information to pet owners is not consistent, and highlight specific topics that could benefit from improvement. Moreover, the use of multiple types of assessment formats (i.e. questionnaires and/or interviews and/or appointment observation) could maximize reliability, validity and feasibility for the assessment of communication in the veterinary clinic environment.

**Key words:** animal welfare, cat, communication, companion animal, dog, veterinary practice, welfare assessment

**Introduction**

Multiple animal welfare assessment schemes have been established and implemented for agricultural animals (e.g. Welfare Quality®), yet formal tools for the assessment of companion animal welfare are not available for the veterinary environment. Although the American Animal Hospital Association (AAHA) and the American Association of Feline Practitioners (AAFP) have each created voluntary certification programs for companion animal veterinary hospitals, their criteria do not include a specific focus on patient welfare. In the first stage of the development of a welfare assessment scheme for veterinary clinics, a survey of animal welfare researchers and practicing veterinarians identified veterinary-related factors that can impact companion animal welfare. In particular, communication of information for various aspects of animal care was ranked highly important for ensuring canine and feline welfare (Dawson et al 2016).

Effective communication skills are crucial for a successful career in veterinary medicine (Lewis & Klausner 2003). Communication has received increasing attention in veterinary curricula, and is deemed a key clinical competency for graduating veterinarians (Mossop et al 2015, North American Veterinary Medical Education Consortium 2010, Ontario Veterinary
College 1996). As general practitioners, veterinarians are in a unique position to educate pet owners through information provided during appointments. Pet owners use veterinary visits as a main source of information, and place the most confidence in the information provided by their veterinarian during these visits, compared to sources such as the Internet, friends or books (Kogan et al 2008). Pet owners also have an expectation that their veterinarian will educate them and provide information upfront in various forms (Coe et al 2008). Unmet client expectations and poor communication are also linked with a lack of compliance with veterinary advice and lower client satisfaction (American Animal Hospital Association 2003, Case 1999, Coe et al 2008). It is thus important that veterinarians proactively provide information during veterinary appointments, particularly because owners might be unaware of what constitutes a problem, or how or what questions to ask; without proactive discussion, issues might be left unaddressed. For instance, through questionnaires, pet owners identified 58 behaviour problems in their dogs, yet only 10 of these problems were discussed during recorded consultations (Roshier & McBride 2013). Moreover, the proactive provision of advice can also prevent issues prior to their development. Puppies and kittens whose owners received a proactive consultation with a veterinary behaviourist during their first veterinary appointment showed a reduced incidence of problem behaviours into adulthood (Gazzano et al 2008, Gazzano et al 2015).

Despite the importance of communication and providing information in a preemptive manner, many veterinarians might not consistently discuss aspects of animal care, welfare and behaviour. Across almost 300 recorded veterinary appointments, MacMartin and colleagues (2015) found that nutrition was discussed in 61% of all appointments, and that these nutrition discussions were initiated by the veterinarian only 57% of the time; in other words, nutrition was proactively discussed in 35% of all recorded appointments. A small-scale study examining 17
canine patient appointments found that while broad-level behaviour (e.g. training) discussions occurred in all appointments, the conversations were initiated more or less equally by clients and veterinarians (Roshier & McBride 2013). Broad-level medical (e.g. weight) and husbandry (e.g. diet) discussions also occurred in all appointments, in a more proactive manner than behaviour, but still with some prompting from clients (Roshier & McBride 2013). Other studies have found that biolifestyle-social discussions, (e.g. exercise, temperament and behaviour) occur at a lower frequency than biomedical discussions (e.g. medical condition, treatment, prognosis), and that veterinarians are less likely to educate their clients during wellness appointments than they are when the patient is presented for an owner-identified problem (Shaw et al 2008).

Given its importance both to the client and for the patient’s welfare, the main objective of our study was to develop and evaluate an assessment tool for the communication of information regarding animal care and welfare by veterinary staff members (i.e. veterinary technicians and/or veterinarians). By visiting 30 veterinary clinics and assessing communication through three different methods, our goal was to identify the most appropriate tools to evaluate communication of information concerning animal care and welfare based on reliability, practicality, and validity. As a secondary objective, we aimed to explore the level of communication on topics previously deemed important to patient welfare by examining the data collected during the evaluation of this tool. We also aimed to establish a baseline for benchmarking, and to determine the measures with sufficient variability across veterinary clinics, and with enough opportunity for enhancement to warrant inclusion in an overall welfare assessment tool for clinics.
**Materials and Methods**

The study described here was part of a larger study with an overarching goal of developing and evaluating a tool to assess overall companion animal welfare in relation to veterinary care. This tool includes aspects such as the communication of welfare-related information, pain assessment and management, and practices related to behavioural health; the communication section of this tool is described in this chapter. The general process through which this tool was developed is outlined in Figure 3.1.

**Ethical approval**

This study was approved by the Research Ethics Board (REB #13JN017) and the Animal Care Committee (AUP #2272) at the University of Guelph. The invitation letter can be found in Appendix III, the consent form for veterinary clinic staff participants can be found in Appendix IV, and the consent form for pet owner participants can be found in Appendix V.

**Hospital recruitment**

The College of Veterinarians of Ontario’s online listing of accredited companion and mixed animal veterinary practices in Ontario was used as a source for recruitment of clinics. Inclusion and exclusion criteria included the following factors: within 100 km of the University of Guelph; not primarily an emergency or specialty hospital; not associated with a humane society or a teaching facility; and at least 50% of the practice dedicated to treating companion animals. A minimum sample of 30 veterinary clinics was deemed necessary to produce sufficient power to assess reliability via weighted kappa statistics (Sim & Wright 2005). Invitations to participate were mailed to the owners of veterinary clinics in four batches. The first three batches
of invitations were sent to 286 randomly selected clinics. However, to reach our goal of visiting 30 veterinary clinics, it became necessary to invite all veterinary clinics that fulfilled our selection criteria, resulting in a non-random sample. Because they expressed interest in participating in future studies, six veterinarians from a previous study, who were employed at clinics outside the 100 km radius, were also invited to participate. A total of 474 invitations were sent, 417 of which were to companion animal clinics and 57 to mixed animal hospitals. Clinics that did not respond within 14 days received a follow-up phone call to encourage participation. Up to two follow-up telephone calls and one follow-up e-mail were sent to each clinic. This follow-up process continued until a total of 30 clinics had been scheduled for a visit.

Initially, clinic visits were scheduled with the goal of visiting on a day when a minimum of three canine and three feline appointments were scheduled, excluding euthanasia and recheck appointments. As many clinics could not meet these requirements, our scheduling criteria were modified partway through the study (after 286 invitations), such that visits were completed on days when a minimum of three appointments were scheduled, with any combination of appointments with dogs or cats, excluding euthanasia and recheck appointments. Written consent was obtained from all veterinary staff members who participated in any portion of the assessment.

**Questionnaire**

Participating clinics were instructed to have a senior veterinarian complete a questionnaire (Appendix VI), either online using LimeSurvey (version 1.91+) or on paper, prior to the day of the visit; however, some clinics only returned the questionnaire during or after the visit. The questionnaire included questions about the different situations in which various topics
were discussed with clients during routine preventive appointments. Specifically, it included questions about whether topics were routinely discussed for animals at different life stages (i.e. puppies, kittens, adult dogs, adult cats), and whether topics were discussed under other circumstances (i.e. if previous problems were in the patient’s chart, if the client suggested a possible problem, other, or never). Respondents were asked to check all categories that applied. Discussion topics are listed in Table 3.1, and were drawn from a previous study that identified aspects of veterinary care that can impact patient welfare (Dawson et al 2016). The questionnaire was pilot tested in one veterinary clinic and no modifications were required. As questionnaires focused on the evaluation of communication practices, management-based measures of animal welfare were employed.

Responses were scored by the observers as either no discussion (‘none’, score = 1), reactive discussion (score = 2) or proactive discussion (score = 3). A score of ‘none’ was assigned if the topic was never discussed, ‘reactive’ if the topic was only discussed when the owner suggested a possible problem or if it was routinely discussed with only a subset of patients (e.g. puppies), and ‘proactive’ if the topic was routinely discussed with all patients or when there were previous problems in the patient’s medical record. For any single topic, when responses met criteria for multiple categories, the higher score was assigned. For example, if the veterinarian reported that he/she routinely discusses a topic with all patients, corresponding to a score of 3 (‘proactive’), but also discusses it when the client suggests an issue, corresponding to a score of 2 (‘reactive’), a final score of proactive (3) was assigned for the discussion of the topic. Initially, the scoring scheme was evaluated for clarity and comprehensiveness on a subsample of questionnaires.
Each questionnaire was scored independently by three observers (one experienced observer [LD, observer 1] and two inexperienced observers [observers 2 and 3]) to investigate inter-observer reliability, and scored twice by the experienced observer to assess intra-observer reliability. Observer 1 was a doctoral student in animal behaviour and welfare with experience in animal welfare assessment, observer 2 was a master’s student in animal behaviour and welfare, and observer 3 was an upper-year undergraduate science student with an interest in animal welfare. All three observers participated in a training session led by the experienced observer prior to scoring, to ensure consistency across observers. This training session included careful review of all scoring material, and the independent scoring of three questionnaires followed by review and discussion of scores with the group. The two inexperienced observers were permitted to ask the experienced observer for clarification regarding any aspect of the scoring scheme for the first five questionnaires; after that, discussion amongst observers was not permitted, to allow for the true assessment of reliability between independent observers. Questionnaires were scored in random order, and placed in a different random order for the second round of scoring by the experienced observer; re-scoring was conducted a minimum of five weeks after initial scoring, to reduce bias associated with the observer’s memory of initial scores.

Interview

Interviews were conducted with either the clinic owner or a senior veterinarian recommended by the clinic owner. All questions were open-ended and followed a script (Appendix VII). Interview questions were developed based on results from a previous study (Dawson et al 2016) and were pilot tested with one veterinarian for comprehension. As interviews focused on the evaluation of communication practices, management-based measures
of animal welfare were employed. Interviews included questions concerning other topics (e.g. pain management) that are not presented in this manuscript. Most interviews were performed in person, although some were completed by telephone if the veterinarian was not able to participate on the day of the visit. Interviews were completed at the convenience of the interviewee, and were thus completed at various times with respect to the questionnaire and appointment observations. All interviews were voice recorded using an audio recorder (Zoom H2next Handy Recorder, Zoom Corporation, Tokyo, Japan) and manually transcribed by a research assistant for analysis by three observers (described below).

Interview responses were also scored as either no discussion (‘none’, score = 1), reactive discussion (score = 2), or proactive discussion (score = 3). A score of ‘none’ was assigned if the topic was not routinely discussed, ‘reactive’ if the topic was typically discussed when a particular issue came up during the appointment (i.e. if an issue arose during the physical exam, if the owner initiated discussion, or through passive discussion in which the veterinarian asked general open-ended questions, such as “has he been good?”), and ‘proactive’ if the veterinarian routinely initiated discussion of the topic. Responses to questions regarding the discussion of judging quality of life, end of life and euthanasia, as well as animal behaviour (pain, stress, play) were scored as ‘reactive’ if an issue had arisen and immediate action needed be taken (score = 1), ‘issue’ if discussion occurred when there was a pre-existing, ongoing issue or the owner suggested as issue (score = 2), and ‘proactive’ if the veterinarian routinely initiated discussion of these topics with senior patients, seriously ill patients, or all patients regardless of wellness status, respectively (score = 3). The scoring scheme was initially evaluated for comprehensiveness and clarity on a subset of interviews. As with the questionnaire, following a training session and any additional clarification up to the fifth interview, interview responses
were independently scored by three observers (observers 1, 2, 3) in a random order to assess inter-observer reliability, and scored a second time by the experienced observer to assess intra-observer reliability. Scoring occurred only at the end of the data collection period, after all the interviews were complete. Repeat scoring for intra-observer reliability was conducted a minimum of eight weeks after initial scoring.

Appointment observation

Two video cameras (Sony Handycam HDR-CX220, Sony Corporation, Tokyo, Japan), mounted on flexible tripods (Joby GorillaPod SLR-Zoom, JOBY, Petaluma, CA, USA) were installed in each exam room. Cameras were aimed to capture as much of the room as possible, particularly focusing on the exam table and the floor. Owners were approached in the waiting room with information about the study, and if they agreed to participate their written consent was obtained prior to entering their appointment; all owners with appointments were approached, including those that were scheduled for recheck appointments, but excluding those that were scheduled for planned or potential euthanasia appointments.

Up to six appointments were analyzed per clinic. When more than six appointments were video recorded at a clinic, three canine and three feline appointments were randomly selected for analysis. For some clinics, less than six appointments were video recorded, and for others, there were less than three feline appointments so additional canine appointments were selected to make up the difference. Topics of interest were selected based on results of a previous study that identified areas of veterinary care considered to impact patient welfare (Dawson et al 2016). Discussion of each topic was scored on a five-point Likert scale from ‘strongly disagree’ through to ‘strongly agree’ (see Appendix VIII for scoring sheet). Each topic was scored twice based on
the video recording: once for the veterinarian’s discussion; and once for the extent to which the owner initiated the discussion. If a technician entered the appointment before the veterinarian to collect background information or perform a preliminary physical examination, a score was also assigned to the technician and the owner for the duration of their interaction. Appointments were categorized according to their apparent purpose: wellness; problem; or recheck. Wellness appointments were defined as those in which an apparently healthy animal was brought to the veterinary clinic for the purpose of routine veterinary preventive care, such as for an annual physical exam, vaccinations, or preventive parasite control. Problem appointments were defined as those in which an animal was brought to the clinic with the goal of diagnosis and treatment of a health concern. Recheck appointments were defined as those in which an animal was brought to the clinic for the purpose of follow-up after a recent visit, such as a post-surgical examination, suture removal, bandage change, or evaluation of treatment response. As appointment observation focused on the evaluation of communication practices, management-based measures of animal welfare were employed.

To assess inter-observer reliability, three observers (observers 1, 4, 5) independently scored each appointment. Observer 1 was a doctoral student in animal behaviour and welfare, and observers 4 and 5 were upper-year undergraduate science students with an interest in animal welfare. Prior to scoring, the two inexperienced observers underwent a training session with the experienced observer, during which all scoring materials were reviewed, and five appointments were scored independently followed by a group discussion of scores. To assess intra-observer reliability, the experienced observer (observer 1) re-scored a total of 50 recordings of appointments; 11 randomly selected clinics were used for this purpose and all appointments from each selected clinic were re-scored. According to Cicchetti (1981), an appropriate sample size
for weighted kappa statistics is twice the square of the number of rating categories. With five scoring categories, a sample size of 50 was therefore considered to be appropriate for this investigation of intra-observer reliability. Re-scoring was conducted in a random order, with a minimum of 20 weeks after initial scoring.

**Statistical analysis**

To assess inter- and intra-observer reliability, weighted kappa statistics using exact Monte Carlo estimates, and 95% confidence intervals for these weight kappa statistics, were calculated separately for each assessment method (i.e. questionnaire, interview, appointment observation data). These statistics were calculated both at the discussion topic-level and across all topics within each assessment method, producing a reliability statistic for the scoring of questionnaires, interviews, and appointment observations as a whole. Pair-wise comparisons were made between the experienced observer (observer 1) and each inexperienced, trained observer, and between the experienced observer and herself. All weighted kappa statistics were calculated using SAS 9.4 (SAS Institute Inc., Cary, NC, USA) using quadratic weighting. Weighted kappa statistics were chosen as they account for the degree of disagreement, whereby disagreements that are closer together on the scoring scale are given partial credit for less disagreement than those that are further apart (Viera & Garrett 2005).

For questionnaire and interview data, weighted kappa statistics were based on scores on a three-point scale (no discussion, reactive discussion, proactive discussion). For appointment observation data, weighted kappa statistics were calculated at the overall appointment observation level (across all discussion topics) in four different ways: veterinarian communication scores on a five-point Likert scale; owner initiation of discussion scores on a
five-point Likert scale; a combination of the veterinarian and owner scores on a five-point Likert scale; and scores on a three-point scale (proactive-reactive-none) reflecting type of discussion. For the three-point scale analysis, each topic was scored as having not been discussed (‘none’, score for staff member ≤ 3), reactively discussed (score for owner ≥ 4 and score for staff member ≥ 4), or proactively discussed (score for staff member ≥ 4 and score for owner ≤ 3); a score of 4 was used as a cut-off for discussion as it corresponds to ‘agree’ on the five-point Likert scale. For appointments in which both the technician and veterinarian had discussions with the client, the higher discussion score (i.e. proactive > reactive > none) between the two staff members was used. This decision was made on the premise that the role of the staff member is less important than the fact that the information was provided at all, and that a veterinarian might not discuss topics that a technician has already covered, and so should not be penalized if this occurs.

Weighted kappa statistics ($K_w$) were interpreted according to Landis and Koch’s (1977) thresholds. The authors suggested that a $K_w$ greater than 0.80 represents almost perfect agreement, a $K_w$ between 0.61 and 0.80 represents substantial agreement, a $K_w$ between 0.41 and 0.60 represents moderate agreement, a $K_w$ between 0.21 and 0.40 represents fair agreement, and a $K_w$ between 0.00 and 0.20 represents slight agreement.

Statistics describing the percentage of veterinary clinics and/or the proportion of appointments in which discussions occur were also calculated. These were based on the experienced observer’s scores, and were calculated separately for each discussion topic within each assessment method (questionnaire, interview, appointment observation). For appointment observation data, descriptive statistics were based on the three-point proactive-reactive-none scale described above. For each topic, the percentage of appointments with proactive and reactive discussions was compiled at the clinic level for all appointments, and for wellness
appointments, specifically. Measures of central tendency (i.e. median, range) for the scoring of each topic, in each assessment method, were also computed.

Results

Participants

Of the 474 veterinary clinics invited to participate, 355 were followed up with: 41 (9%) agreed to be involved, 105 (22%) declined to participate, and 209 (44%) did not provide a response; of those who agreed to participate, the first 30 clinics to schedule visits were included. Furthermore, 119 (25%) invited veterinary clinics were not individually followed up with because we had scheduled visits with our target sample size of 30 veterinary clinics. Participation rates were approximately 6% (24/417) for companion animal practices, and 11% (6/57) for mixed animal practices. Companion animal veterinary practices accounted for 80% (24 of 30) of all participating clinics, and mixed animal practices accounted for 20% (6 of 30). All participating clinics treated cats, and all but one clinic treated dogs. Moreover, five participating veterinary clinics were AAHA Accredited®, and five veterinary clinics were participants of the AAFP Cat Friendly Practice® program.

Scoring reliability: questionnaire

Values for raw percentage agreement and weighted kappa statistics describing inter- and intra-observer reliability for the scoring of questionnaire responses are outlined in Table 3.1. For questionnaire scoring overall (i.e. across all discussion topics), percentage agreement was 95% and 98% for each of the two inexperienced, trained observers compared to the experienced observer, and 98% for re-scoring by the experienced observer.
For questionnaire scoring overall, weighted kappa statistics were 0.86 and 0.93 for the two inexperienced observers compared to the experienced observer, and 0.95 for re-scoring by the experienced observer (see Table 3.1). Both inter- and intra-observer reliability, thus, reached almost perfect agreement ($K_w > 0.80$). For individual discussion topics, weighted kappa statistics for inter-observer reliability indicated at least substantial agreement, with values ranging from 0.61 to 1.00. Four discussion topics (i.e. ‘dental health’, ‘appropriate training methods’, ‘mental stimulation’, ‘prevention of behaviour problems’) showed almost perfect agreement ($K_w > 0.80$) between observers. For individual discussion topics, intra-observer reliability showed almost perfect agreement, with values ranging from 0.87 to 1.00 ($K_w > 0.80$). Notably, the discussion of ‘dental health’, ‘appropriate training methods’, ‘body condition’, and ‘new or ongoing behaviour problems’ showed perfect agreement ($K_w = 1.00$) for intra-observer reliability over two scoring sessions by the experienced observer.

*Scoring reliability: interview*

Values for raw percentage agreement and weighted kappa statistics for the scoring of interview responses are outlined in Table 3.2. Percentage agreement was lower for interview scoring compared to questionnaire scoring. At the interview level overall (i.e. across all discussion topics), percentage agreement between the two trained observers and the experienced observer were 62% and 81%, and repeat agreement was 86% for the experienced observer (see Table 3.2).

Generally, weighted kappa statistics describing both inter- and intra-observer reliability were also lower for the scoring of interview responses than they were for questionnaire responses. At the interview level overall, inter-observer reliability showed fair and moderate
agreement ($K_w = 0.40$ and $0.44$ for each pair of observers), whereas intra-observer reliability showed almost perfect agreement ($K_w = 0.81$). For individual discussion topics, scoring within the experienced observer was more reliable than across observers, with weighted kappa statistics ranging from $-0.04$ to $0.73$ for inter-observer and $0.50$ to $0.97$ for intra-observer reliability.

Scoring responses concerning the discussion of ‘end of life and euthanasia’ also had the lowest degree of inter-observer reliability, reaching slight to poor agreement ($K_w = -0.04$ and $0.13$); this was also the topic with the lowest degree of intra-observer reliability ($K_w = 0.53$). Inter-observer reliability generally showed considerable variability, with no consistent pattern in terms of one observer pair showing better agreement than the other. For intra-observer reliability, only two topics (i.e. ‘training and behaviour’, and ‘end of life and euthanasia’) showed agreement below the almost perfect agreement threshold ($K_w < 0.80$).

**Scoring reliability: appointment observation**

Values for raw percentage agreement and weighted kappa statistics for the scoring of appointment observations are outlined in Table 3.3. Overall (i.e. across all discussion topics), percentage agreement was $88\%$ and $87\%$ for the two inexperienced observers compared to the experienced observer, and $94\%$ for the experienced observer when re-scoring a subsection of appointments; thus percent agreement for appointment scoring was higher than interview scoring, yet lower than questionnaire scoring.

Weighted kappa statistics describing inter- and intra-observer reliability for the scoring of communication by veterinary staff members during veterinary appointments, based on the three-point scale, are outlined in Table 3.3. When considering appointment scoring as a whole, reliability was in the substantial agreement range for both between and within observer scoring,
with inter-observer reliability towards the lower end ($K_w = 0.61$ and 0.64) and intra-observer reliability towards the upper end of the range ($K_w = 0.80$). Thus, agreement for appointment observation scoring was generally higher than interview scoring, yet lower than questionnaire scoring. At the discussion topic level, weighted kappa statistics for inter-observer reliability had a wide range ($K_w = -0.02$ to 1.00), with the scoring of discussion regarding ‘alternatives to medically unnecessary procedures’ having the lowest reliability and discussion regarding ‘end of life and euthanasia’ having the highest reliability. At the discussion topic level, weighted kappa statistics for intra-observer reliability also had a wide range ($K_w = 0.19$ to 1.00); however, only one discussion topic, ‘behaviour issues’, had reliability below 0.41 (i.e. less than moderate agreement). Of note, discussion regarding ‘alternatives to medically unnecessary procedures’ and ‘behaviour issues’ had the lowest weighted kappa statistics both between and within observers, yet they had high percent agreements (96% and 85% respectively for these topics).

Weighted kappa statistics for the inter- and intra-observer reliability of appointment observation scoring overall (across all discussion topics) based on the four methods of compiling scores are outlined in Table 3.4. Weighted kappa statistics were highest for veterinarian communication scored on a five-point Likert scale ($K_w = 0.74$ and 0.77 for inter-observer reliability, $K_w = 0.91$ for intra-observer reliability) and lowest for owner initiation of discussion scored on a five-point Likert scale ($K_w = 0.74$ and 0.77 for inter-observer reliability, $K_w = 0.91$ for intra-observer reliability). Regardless of the method in which appointment observation scores were compiled, there was moderate to substantial agreement for the two inexperienced observers compared to the experienced observer, and substantial to almost perfect agreement for re-scoring by the experienced observer.
Descriptive statistics: questionnaire

Twenty-seven of thirty questionnaires (90%) were completed and returned. Questionnaires were sometimes returned prior to the visit, sometimes during the visit, and often after the visit; in other words, the timing of their return with respect to the interview and appointments was not consistent among veterinary clinics. The percentage of respondents who indicated that they routinely discussed each topic during routine preventive appointments for animals at different life stages (i.e. puppies, kittens, dogs and cats) is outlined in Table 3.5. At least 85% of veterinary clinics reported that they routinely discussed ‘food type and amount’, ‘body condition’, and ‘dental health’, regardless of patient life stage. A large proportion of veterinary clinics routinely discussed the ‘prevention of behaviour problems’ as well as ‘appropriate training methods’ for young patients (96% and 93% for puppies and kittens, respectively), whereas a much lower proportion routinely discussed these topics for adult animals (35% and 33% for dogs and cats, respectively). Conversely, a higher proportion of veterinary clinics indicated they routinely discuss ‘pain assessment and management’ as well as ‘cognitive decline’ for adult animals compared to young patients.

Table 3.6 highlights measures of central tendency for the scoring of each discussion topic. For each topic, median scores were 3, corresponding to proactive discussion. Scores for ‘food type and amount’ as well as ‘pain assessment and management’ showed no variation across clinics; all received a score of 3. Scores ranged from 2 to 3 for all other topics except ‘mental stimulation’ and ‘appropriate training methods’. In other words, there was low variability across the full range of possible scores for the majority of discussion topics.
Descriptive statistics: interview

A veterinarian representing each participating veterinary clinic completed the interview (30 clinics, 100% completion rate), and four interviews were completed in part or in whole by telephone. The majority of veterinarians indicated that ‘veterinary preventive care’, which includes vaccinations, diagnostic testing, dental care, and parasite control, was discussed proactively (Table 3.7). Although more than half of veterinarians (57%) indicated that they proactively discussed ‘basic care and animal needs’, such as exercise, nutrition, and mental stimulation, most of the remaining veterinarians (37%) reported that they reactively discussed these topics, such as when an issue arose or the owner instigated discussion. A small proportion (7%) reported that they never discussed ‘basic care and animal needs’; these individuals noted that they knew their clients were aware of how to care for their pets and did not consider these discussions necessary. Communication of information regarding ‘behaviour’, including training, and identification and prevention of behaviour problems, was most often reactively discussed. Conversely, discussions regarding ‘animal behaviour’ (e.g. signs of pain, distress, normal play behaviour), ‘end of life and euthanasia’, as well as ‘judging quality of life’, were reported to occur mainly with issues requiring immediate action.

Scoring variability was higher for interview responses compared to questionnaire responses (see Table 3.6). Scores ranged from 1 to 3 for each discussion topic except ‘veterinary preventive care’ and ‘animal behaviour’, which had scores ranging from 2 to 3. Median scores were 3 (proactive discussion) for ‘veterinary preventive care’ as well as ‘basic care and animal needs’, and 2 (reactive) for all other discussion topics.
Descriptive statistics: appointment observation

Between two and 14 appointments were video recorded at each veterinary clinic. Our original goals of capturing a minimum of six veterinary appointments and three feline appointments were met in only 17 and 10 veterinary clinics respectively; in other words, less than six appointments were captured in 13 of the clinics who participated, and less than three feline appointments were captured in 20 out of 30 clinics. It became necessary to visit two clinics on two occasions in order to capture any appointments at all, and feline appointments were not captured in one clinic. With a maximum of six appointments reviewed per clinic (median: 6, range: 2 to 6), a total of 152 video recordings of appointments were analyzed, including 90 (59%) with canine patients and 62 (41%) with feline patients. Wellness, problem and recheck appointments accounted for 55%, 35%, and 10% of the 152 analyzed appointments, respectively. For three of the veterinary clinics we did not capture a single wellness appointment. At least one veterinarian was present in each appointment, and a technician was present in 60 (40%) of the analyzed appointments. Average appointment length, defined as the time that the owner was in the exam room, was 23.5 minutes (median: 20.5 minutes, range: 3 to 71 minutes).

During appointments, ‘veterinary preventive care’ (i.e. vaccinations, diagnostic testing, dental care, parasite control, sterilization) was the topic discussed proactively most often (Table 3.8). This proportion increased to almost half of clinics (14 clinics) when focusing specifically on wellness appointments (Table 3.9). With the exception of ‘veterinary preventive care’ as well as ‘basic care and animal needs’ (e.g. nutrition, exercise, enrichment), each topic was proactively discussed very infrequently (0 to 20% of all appointments) by the majority of clinics (Table 3.8). However, there was also considerable variation in the frequency of discussions regarding ‘veterinary preventive care’ as well as ‘basic care and animal needs’, with some clinics also
proactively discussing these topics very infrequently (0 to 20% of all appointments). Similarly, with the exception of ‘basic care and animal needs’, each topic was reactively discussed very infrequently (0 to 20% of all appointments) by the majority of clinics.

Generally, there was more variation in the frequency with which information was communicated during wellness appointments compared to all types of appointments combined, with more veterinary clinics providing information at higher frequencies during appointments with healthy animals (Table 3.9). For four topics (i.e. ‘veterinary preventive care’, ‘basic care and animal needs’, ‘transmissible and infectious diseases’, ‘chronic pain’) participating veterinary clinics had proactive discussions at all frequencies; in other words, some clinics preemptively informed pet owners about these topics in a large proportion of their appointments, whereas others did so only rarely. The only topic that was reactively discussed at all frequencies amongst our population of veterinary clinics was ‘basic care and animal needs’.

Across all participating clinics and in all types of appointments, a number of topics were discussed at very low levels overall, such as ‘end of life and euthanasia’ (2 appointments), ‘alternatives to medically unnecessary procedures’ (4 appointments), and ‘pre-purchase or pre-breeding counseling’ (1 appointment).

Discussion

When selecting the most appropriate tools to assess animal welfare, it is important to consider the balance between reliability, validity, and feasibility, with the ideal welfare assessment scheme incorporating measures that maximize all three factors. In the current study, the three different methods of assessment used to assess veterinary communication, i.e.
questionnaire, interview and appointment observation, yielded different results in terms of reliability, validity and feasibility, suggesting that no single method is ideal.

Reliability is the extent to which measures produce consistent results over multiple observers or occasions (Martin & Bateson 1993). Since a measure with low reliability leads to inconsistent conclusions, the assessment of reliability tends to take priority over validity (Meagher 2009). Overall, inter-observer reliability was greatest for questionnaire scoring, followed by appointment observation and interviews, while intra-observer reliability reached the almost perfect level across all three methodologies. Differences in inter-observer reliability between the assessment methods might be partially attributable to differences in the observers used for the evaluation of each section of the tool; the inexperienced observers used for appointment observation were different than those used for the scoring of questionnaires and interviews.

Although weighted kappa statistics are generally a better indicator of reliability because they take chance agreement into account, percent agreement was also generally quite high across all three methods in our study. Large percentage agreement with low to moderate weighted kappa statistics suggests that the few disagreements that did occur were likely large in magnitude (e.g. behaviour issues in appointments). This discrepancy also suggests that there was little variability in the data or between veterinary clinics, with some observations being rare or nonexistent, as was the case for some discussion topics. When there is low variability, kappa statistics are also not computable; this occurred for the scoring of questionnaire responses regarding food type and amount as well as pain assessment and management, in which every clinic received the same score across every observer pair. Since kappa statistics are influenced by prevalence, they can also become unreliable for rare or very common observations, and therefore
do not necessarily always reflect very poor agreement (Sim & Wright 2005, Viera & Garrett 2005).

There are no guidelines outlining acceptable levels of reliability statistics, so establishing cut-points for the inclusion or exclusion of certain welfare assessment measures into a welfare assessment tool would be completely arbitrary (Meagher 2009). Fleiss and colleagues (2003) have suggested a value of 0.40 as the lowest acceptable value for a kappa statistic. Using this cut-point, the overall inter- and intra-observer reliability for all three assessments methods would be considered acceptable, although reliability would generally be maximized if communication were assessed via questionnaires.

While overall reliability was relatively good, a number of discussion topics from the interviews (i.e. ‘companionship’, ‘judging quality of life’, ‘end of life and euthanasia’) and appointment observations (i.e. ‘animal behaviour’, ‘behaviour issues’, ‘alternatives to medically unnecessary procedures’, ‘appropriate sources for independent consultation’) did not meet the minimum kappa threshold of 0.40 for inter-observer reliability in at least one pair of observers. In other words, if a weighted kappa statistic of 0.40 were used as a cut-point for inclusion, 3 out of the 7 items from the interview and 4 out of the 14 items from appointment observation would be removed from the welfare assessment tool. As such, although these topics are important and relevant to animal welfare, reliability might be too low for these particular topics to be included in an overall welfare assessment tool. Research suggests that reliability can be improved through training observers over multiple sessions with regular repeated check-ins (Gibbons et al 2012). These methods were incorporated into the training program for the current study, with observers permitted to clarify scoring for the first five questionnaires, interviews and appointments, but further training at regular intervals was not incorporated and might have improved reliability.
Given the large number of materials to score (i.e. 27 questionnaires, 30 interviews, 152 appointments) and a lack of re-calibration at regular intervals, such as repeated training sessions, drift in scoring over time might have occurred. Alternatively, it is possible that these topics involve a higher level of subjectivity during assessment in comparison to the other topics that had a higher level of agreement, making them inherently less reliable. This latter explanation is supported by relatively low kappa scores for intra-reliability for the experienced observer who also developed the scoring and training methods.

One area of reliability that was not assessed as part of the current study was test-retest reliability, which assesses the extent to which similar conclusions can be drawn over repeated measurements. If a welfare assessment program categorizes a veterinary clinic in one way, it is important that similar results, and similar categorization, would be reproduced over multiple future visits, assuming that infrastructure, management or general practices have remained consistent. For instance, responses might differ by the veterinarian, staff members within the same clinic might take distinct approaches in appointments, and different types of appointments might occur on different days. Thus, further research assessing test-retest reliability is necessary to ensure that the current measures accurately reflect the true welfare status of each clinic.

Validity is the extent to which a measure accurately assesses the true state of what it is attempting to measure (Martin & Bateson 1993). Appointment observations provide a direct measure of staff communication during actual appointments, whereas questionnaires and interviews are indirect measures that can be prone to recall and social desirability bias. Issues with recall occur when participants do not accurately or fully remember previous experiences (Choi & Pak 2005), and social desirability bias occurs when participants provide responses that are in line with social norms, or that they believe the researchers want to hear (Tourangeau &
Yan 2007). Recall and social desirability bias are minimized through appointment observation in comparison to methods that involve direct interaction with the researcher; while being recorded might alter staff members’ behaviour, more than 80% of veterinarians participating in a study with similar methods noted that being recorded did not impact their clinical competency nor their ability to be their usual selves during appointments (Shaw et al 2004). When comparing the interview and questionnaire results to data from the appointment observations, it is clear that bias occurred during the interview and questionnaire, since they do not accurately reflect what occurred in terms of communication during the observed appointments. Since questionnaires were completed independently by the veterinarian, whereas interviews were conducted by a researcher, bias due to social desirability is likely lower for questionnaires than for interviews. Based on these results, appointment observation appears to be the most valid way to assess communication by veterinary staff members to owners during veterinary visits.

Feasibility refers to the ease with which a measure can be taken. Questionnaires, and to some extent interviews, allow welfare to be assessed remotely, thus requiring less time and effort from assessors. While appointment observations require more time for collection and analysis, they require much less time of veterinary staff members from participating veterinary clinics. However, under the format of a single daylong visit to each veterinary clinic, it was challenging to record an adequate number of veterinary appointments, compared to the ease of collecting questionnaire and interview data. We were unable to attain our original goal of capturing six appointments during a single day visit. It was also not possible to always record a wellness appointment or in some instances, any appointments at all. Thus, appointment observation has low feasibility without major modifications to methodology. Providing veterinary clinics with video cameras over an extended period of time could allow for a greater number of appointments
to be captured, although equipment costs would be higher and veterinary staff would have to obtain owner consent. While this would increase feasibility, it might be at the sacrifice of validity if, for example, staff members selectively video record certain appointments rather than all appointments during a given time period. Nonetheless, scoring appointment recordings is likely impractical for a final assessment tool due to the extensive amount of time required from observers. Mean appointment length was approximately 23 minutes, with some appointments lasting as long as 71 minutes, and appointments must be viewed and analyzed in full to adequately assess communication. Thus, while modifying the data collection approach might increase feasibility, the scoring aspect would still remain impractical, unless fewer than six appointments could be scored per veterinary clinic. The decision to analyze six appointments was made under the assumption that there would be variability in appointment type (i.e. wellness, problem, recheck) and species (i.e. dog, cat). This variability might lead to differences in communication; therefore, fewer than six appointments might not capture each of these situations. On the other hand, if we can expect communication to be consistent and proactive across all appointment types, this number could be reduced and feasibility would be increased.

When considering each of the three methods used to assess veterinary communication of information related to animal welfare, no single method appears to clearly maximize reliability, validity and feasibility. Questionnaires have the highest observed inter-observer reliability, and are also generally quite feasible to carry out, but have lower validity. While recordings of appointments have the highest validity, and showed an acceptable degree of inter- and intra-observer reliability, considerable effort and time are required to both capture and score videos. As such, in order to maximize reliability, validity and feasibility overall, it might be necessary to take a mixed methods approach to assessing veterinary staff-client communication. Some
communication topics could be assessed through questionnaires, such as those that occur infrequently and would require much effort to assess in alternative ways. For example, discussions around ‘appropriate sources of information’, ‘pre-purchase and pre-breeding advice’ and ‘alternatives to medically unnecessary procedures’ occur at low frequencies, and are likely to only occur once or twice in an animal’s lifetime rather than over multiple veterinary visits. As such, a large number of appointments would be required to capture the discussion of these topics in each veterinary clinic, yet a questionnaire or interview could allow for their assessment with far less effort. Other topics might be better assessed through appointment observation, particularly for topics that veterinarians might be reluctant to admit to discussing infrequently. For instance, veterinarians might not readily acknowledge in an interview or questionnaire that they rarely provide information about behaviour and training. A more feasible alternative to appointment observation could be post-appointment surveys of pet owners to assess the information they have obtained during veterinary appointments. Compared to a trained observer, some pet owners might not readily recognize the discussion of certain topics, or provide an accurate interpretation of whether the discussion was initiated by the veterinarian of the client. Nonetheless, if information is not successfully transferred to the owner, then there is no chance of it positively impacting the patient’s welfare, so client surveys could at minimum assess whether the client received the information. Moreover, successful information transfer does not guarantee welfare improvements in the home environment; there is no proof that the provision of information concerning animal care and welfare leads to measurable improvements in companion animal welfare once the animal returns home. The most direct evaluation of the impact of communication on animal welfare would therefore be via the use of animal-based measures in the animal’s home environment. This would have very poor feasibility as part of a
formal welfare assessment tool so information transfer, as assessed by the owner, is likely the most feasible direct indication of the impact of communication on welfare in the home environment.

Another important aspect to the development of a welfare assessment tool is the ability to discriminate between different participants. In other words, the included measures should show variation across clinics, making it possible to distinguish the performance of one veterinary clinic from another. For instance, if every veterinary clinic receives similar scores on any aspect of the tool, that aspect does not provide enough information to allow differentiation, and would not be a useful measure to include. Moreover, with respect to tool development, floor effects are less detrimental than ceiling effects, since little score variation at the low end of the scale leaves opportunity for enhancement. Scores from questionnaire responses showed low variation between veterinary clinics; for all topics except ‘mental stimulation’ and ‘appropriate training methods’, scores were limited to the upper end of the range. This does not permit discrimination in terms of the provision of information, and suggests that either the majority of veterinary clinics are communicating this information well, or that the scoring criteria have been set such that high scores are too easily attainable. Alternatively, low validity with respect to a reflection of true communication practices could also be responsible for this low variability. Variation in scoring, and the subsequent ability to differentiate between clinics, was higher for interviews than questionnaires, with participating veterinary clinics scoring across the full range of the scale for all topics except ‘veterinary preventive care’ and ‘animal behaviour’. Interviews thus appear to have better discriminatory power than questionnaires. In terms of appointment observation, there was some variation across all topics, with increased variation seen when focusing exclusively on wellness appointments. While four discussion topics from appointment
observations showed very low variability at the clinic level (i.e. ‘alternatives to medically unnecessary procedures’, ‘pre-purchase and pre-breeding counseling’, ‘end of life issues’ and ‘sources for independent consultation’), scores were generally low so they can still be useful to include as a means of encouraging improvement in the communication of these types of information. This highlights the importance of setting standards at a high, yet attainable level; standards should be ambitious enough to provide opportunity for enhancement while also remaining at a realistically achievable level.

Across all three methods, ‘veterinary preventive care’ was the only topic routinely and proactively discussed in the majority of veterinary clinics. Questionnaires revealed that the majority of veterinarians routinely discuss ‘food type and amount’, as well as ‘body condition’, with all their patients; ‘dental health’ was also discussed widely during routine wellness appointments. Through interviews, veterinarians outlined that they are most proactive with providing advice regarding ‘veterinary preventive care’, and that ‘training and behaviour’ is the top reactively discussed topic, suggesting that it is often initiated by the owner. Appointment analysis also revealed that ‘veterinary preventive care’ is the most frequently proactively discussed topic during veterinary appointments, followed by ‘basic care and animal needs’, and ‘transmissible and infectious diseases’. As a whole, however, many important topics, such as ‘chronic pain’, ‘appropriate training methods’, ‘animal behaviour’ and ‘behaviour issues’, were discussed at a low frequency during veterinary appointments, even when filtering by appointment type and considering wellness appointments only. We expected low discussion frequencies for topics other than those related to ‘veterinary preventive care’ (e.g. vaccinations) based on results from previous research investigating communication in veterinary appointments. Across nearly 300 appointments with 50 veterinarians, Shaw and colleagues (2008) noted that
discussions concerning biolifestyle-social topics, including exercise, diet and behaviour, occurred in 13% of wellness appointments and 5% of problem appointments. Although difficult to make direct comparisons due to the way topics have been aggregated, results from the current study show similarly low frequencies. Roshier and McBride (2013) have noted that many veterinarians show a lack of confidence in their ability to provide behaviour advice, which might partially explain the low level of proactive discussion of animal behaviour, behaviour problems and appropriate training and handling techniques seen in veterinary appointments.

Investigating the same questions via multiple methods allows comparisons to be made to determine the validity of indirect measures of assessment such as questionnaires and interviews. The current results suggest that there is a mismatch between what veterinarians intend to discuss during their appointments, and what information actually gets discussed in practice. For instance, through questionnaires, the vast majority of veterinarians outlined that they routinely discuss ‘food type and amount’ and ‘body condition’ during routine wellness appointments with patients of all ages and species; 92 to 100% of participating veterinarians positively indicated that they usually provide information about these topics to various subsets of patients. Analysis of appointments, from the clinics at which these veterinarians work, revealed that these discussions occur much less frequently than predicted. ‘Basic care and animal needs’, encompassing food type and amount, body condition, and a number of other topics, were discussed routinely (either proactively or reactively) at only a small subset of clinics. Considering cutoffs of both 81% and 61% for the percentage of appointments in which discussions must occur in order to be considered ‘routine’, discussions seen during video observations do not reach the level expressed through questionnaires. This large mismatch occurs even though topics have been grouped together for appointment observation analysis; in other words, the mismatch would be greater
had topics been kept separate since the way in which videos were analyzed allows an appointment to be scored highly if even one of the subtopics were mentioned. Similar discrepancies were observed between the videos and interview responses. Although topics such as ‘veterinary preventive care’ were discussed more frequently during wellness appointments in comparison to other appointment types, discussion frequency never matched that suggested through interviews.

Questionnaire and interview responses reveal that veterinarians believe they discuss a number of topics at a high frequency, suggesting that they appear to recognize the importance of providing information about these topics; they intend to have these discussions with their clients, but perhaps do not realize how infrequently these conversations occur. Inaccurate recall and social desirability bias can contribute to this mismatch (Tourangeau & Yan 2007); veterinarians might have a skewed memory of what occurs in their appointments, or they might recognize that they should be having these types of discussions and thus respond affirmatively to appear more favourable to the interviewer and reduce any potential judgment. Mismatches could also be due to individual staff differences within each veterinary clinic. A representative from each clinic completed both the questionnaire and interview, but appointments could have been with any or all veterinarians on staff during the day of the visit. While having a single senior representative is our best estimate of general clinic practices, differences in staff members’ approaches might explain inconsistencies in communication in theory compared to reality. Low numbers of wellness appointments at some clinics might have also skewed the distribution of clinics across different levels of discussion; if based on one wellness appointment rather than four, a clinic would be categorized as discussing a given topic at either the highest (81-100%) or lowest (0-20%) level.
It could be argued that it is unfair to expect discussions of each of these topics during every appointment; it might be inappropriate given the nature of the appointment, as some topics are better suited for wellness appointments, while others might only be applicable in problem appointments. As an example, discussions surrounding ‘end of life and euthanasia’, ‘alternatives to medically unnecessary procedures’, such as onychectomy or ear cropping, and ‘pre-purchase and pre-breeding counseling’ occurred very infrequently during captured veterinary appointments, yet it would not have been appropriate to provide advice regarding each of these topics to owners of younger animals, those who have already undergone cosmetic surgeries, or those who have been spayed or neutered, respectively. Some topics, such as the provision of advice regarding ‘appropriate sources of information for independent consultation’ (e.g. recommending a veterinarian over internet sources), likely only require review occasionally throughout the animal’s life, rather than during every veterinary visit. Moreover, it is likely desirable to prioritize the discussion of certain topics rather than provide incomplete information about a more extensive list, particularly since time pressure has been cited as a significant barrier to communication (Coe et al 2008); while mean appointment length was 23.5 minutes, the lower end of the range was only a couple minutes, which could have limited the opportunity to provide extensive advice during some appointments. Regardless, even the topics most frequently discussed during veterinary appointments were not consistently discussed at a high level throughout all appointments. This is not consistent with current veterinary preventive care guidelines, which generally recommend that a number of topics be discussed in every veterinary appointment. For example, the American Animal Hospital Association recommends the discussion of lifestyle, behaviour and diet with every patient as part of the history taking process.
This study is limited by the representativeness of the participating veterinary clinics. Our sample was geographically limited to southern Ontario, and included a relatively small percentage of clinics within the area. Nonetheless, the sample was large and varied enough for the purposes of investigating reliability assessment and tool development, which was our primary goal. In a study with similar motives, Mullan and colleagues (2011) had observers score as few as 20 individual pigs and 20 pens when screening measures of swine welfare for inter-observer reliability and subsequent inclusion into a farm assurance scheme. Furthermore, a sample of thirty veterinary clinics is in line with similar previous studies assessing communication, which was our secondary goal; Coe and colleagues (2009) visited 20 veterinary clinics to explore cost discussions in a total of 200 appointments, and Roshier and McBride (2013) investigated the discussion of behaviour problems through a total of 17 consultations across two veterinary clinics. Nonetheless, future studies could more broadly explore veterinary content communication with a larger sample size and an expansion of the geographic area under study.

Another possible limitation of the study is that those who volunteered to participate might not accurately represent the average veterinary clinic. As a result, this study might be biased towards participants who are inherently more interested in animal welfare and scientific research, and possibly those who are eager to be at the forefront of veterinary medicine. However, there was much variation in the performance of this sample of veterinary clinics, suggesting that participants did have differing practices in regards to animal welfare despite the potential for an increased interest in it. Furthermore, clinic owners consented to clinic participation, yet
assessments involved additional clinic staff members that might not have held the same views. Participation in voluntary accreditation programs might also signal an increase interest in the provision of a higher standard of care, although the number of participating clinics who had chosen to become certified by the AAHA corresponded with national participation in the AAHA program (5 out of 30 clinics versus an estimated 12-15% of hospitals in Canada and the United States; American Animal Hospital Association 2016), and only five participated in the AAFP Cat Friendly Practice® program. The video recording portion of the study might have created biases towards those who are less self-conscious, and perhaps more confident in their abilities as veterinarians. Furthermore, recruitment took place during a time when an investigative undercover journalism piece involving veterinary clinics had aired on Canadian television (CBC Marketplace: “Barking Mad”). This could have influenced the likelihood of veterinarians trusting a third party with video recordings, and contributed to reluctance to participate.

In summary, despite the importance of communication, both to the patient and the pet owner, results suggest that provision of this information by veterinarians is inconsistent. Many veterinarians proactively discussed topics such as ‘veterinary preventive care’; however, a relatively large proportion did not communicate information regarding this and other topics, so there is still much opportunity for enhancement. In terms of the development of an animal welfare assessment tool, questionnaires were the most reliably scored type of measure, with almost perfect agreement both between and within observers. Despite this, no single type of measure maximizes reliability, validity and feasibility, suggesting that a mix of questionnaire, interview and appointment observation is likely the best way to approach assessment of communication in a veterinary clinic setting.
References


Kogan, L.R., Goldwaser, G., Stewart, S.M., Shoenfeld-Tacher, R. 2008. Sources and frequency of use of pet health information and level of confidence in information accuracy, as reported by owners visiting small animal veterinary practices. Journal of the American Veterinary Medical Association, 232(10), 1536-1542.


Figure 3.1: Overall process for the development of a tool to assess companion animal welfare in relation to veterinary care

1. Multi-stage expert survey
2. Veterinary-related factors that impact companion animal welfare
3. Draft companion animal welfare assessment tool for use in veterinary clinics
   - Veterinary-client communication
     • Written questionnaire
     • Verbal interview
     • Appointment observation
   - Pain assessment and management
     • Verbal interview
   - Behavioural health
     • Verbal interview
     • Appointment observation
4. Evaluation of draft welfare assessment tool in Ontario veterinary clinics
   - Reliability of assessment
   - Validity of measures
   - Feasibility of use
Table 3.1: Questionnaire: inter- and intra-observer reliability of scoring responses given by veterinarians from 27 veterinary clinics to a questionnaire regarding the communication of topics related to animal welfare, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Observer 1 vs. 2</th>
<th>Observer 1 vs. 3</th>
<th>Observer 1 vs. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
<td>$K_w$ [95% CI]</td>
</tr>
<tr>
<td>Food type and amount</td>
<td>U</td>
<td>100</td>
<td>U</td>
</tr>
<tr>
<td>Pain assessment and management</td>
<td>U</td>
<td>100</td>
<td>U</td>
</tr>
<tr>
<td>Dental health</td>
<td>1.00 [1.00-1.00]</td>
<td>100</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>Appropriate training methods</td>
<td>0.95 [0.90-1.00]</td>
<td>96</td>
<td>0.95 [0.90-1.00]</td>
</tr>
<tr>
<td>Body condition</td>
<td>0.65 [0.02-1.00]</td>
<td>96</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>New or ongoing behaviour problems</td>
<td>0.61 [0.22-0.99]</td>
<td>89</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>Mental stimulation</td>
<td>0.94 [0.82-1.00]</td>
<td>96</td>
<td>0.94 [0.82-1.00]</td>
</tr>
<tr>
<td>Prevention of behaviour problems</td>
<td>0.91 [0.75-1.00]</td>
<td>96</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>Exercise</td>
<td>0.61 [0.23-0.99]</td>
<td>89</td>
<td>0.61 [0.23-0.99]</td>
</tr>
<tr>
<td>Cognitive decline</td>
<td>0.71 [0.32-1.00]</td>
<td>93</td>
<td>0.87 [0.61-1.00]</td>
</tr>
<tr>
<td>All topics</td>
<td>0.86 [0.79-0.94]</td>
<td>95</td>
<td>0.93 [0.89-0.99]</td>
</tr>
</tbody>
</table>

Observer 1 = experienced observer; Observers 2 and 3 = trained, inexperienced observers

$K_w$ = weighted kappa

% Agree = raw percent agreement

U = uninformative: scores were the same value for each observer pair for all clinics; therefore, variability was too low to calculate weighted kappa statistics
Table 3.2: Interview: inter- and intra-observer reliability of scoring responses given by veterinarians from 30 veterinary clinics to interview questions regarding the communication of topics related to animal welfare, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>$K_w$ [95% CI]</th>
<th>% Agree</th>
<th>$K_w$ [95% CI]</th>
<th>% Agree</th>
<th>$K_w$ [95% CI]</th>
<th>% Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary preventive care</td>
<td>0.64 [0.06-1.00]</td>
<td>93</td>
<td>0.33 [-0.06-0.70]</td>
<td>90</td>
<td>0.97 [0.91-1.00]</td>
<td>97</td>
</tr>
<tr>
<td>Animal behaviour: pain, distress, play</td>
<td>0.45 [0.06-0.85]</td>
<td>73</td>
<td>0.31 [-0.11-0.73]</td>
<td>47</td>
<td>0.88 [0.75-1.00]</td>
<td>87</td>
</tr>
<tr>
<td>Training &amp; behaviour</td>
<td>0.40 [-0.03-0.83]</td>
<td>77</td>
<td>0.73 [0.57-0.90]</td>
<td>73</td>
<td>0.50 [-0.04-1.00]</td>
<td>87</td>
</tr>
<tr>
<td>Basic daily care &amp; animal needs</td>
<td>0.37 [0.09-0.65]</td>
<td>70</td>
<td>0.58 [0.37-0.79]</td>
<td>73</td>
<td>0.87 [0.74-1.00]</td>
<td>90</td>
</tr>
<tr>
<td>Companionship</td>
<td>0.37 [-0.03-0.76]</td>
<td>50</td>
<td>0.27 [0.01-0.54]</td>
<td>43</td>
<td>0.87 [0.71-1.00]</td>
<td>90</td>
</tr>
<tr>
<td>Judging quality of life</td>
<td>0.07 [-0.17-0.32]</td>
<td>80</td>
<td>0.21 [0.00-0.41]</td>
<td>53</td>
<td>0.80 [0.61-1.00]</td>
<td>82</td>
</tr>
<tr>
<td>End of life and euthanasia</td>
<td>-0.04 [-0.34-0.27]</td>
<td>30</td>
<td>0.13 [-0.15-0.42]</td>
<td>53</td>
<td>0.53 [0.16-0.91]</td>
<td>67</td>
</tr>
<tr>
<td>All topics</td>
<td>0.40 [0.26-0.54]</td>
<td>62</td>
<td>0.44 [0.32-0.56]</td>
<td>81</td>
<td>0.81 [0.71-0.91]</td>
<td>86</td>
</tr>
</tbody>
</table>

Observer 1 = experienced observer; Observers 2 and 3 = trained, inexperienced observers

$K_w$ = weighted kappa

% Agree = raw percent agreement
Table 3.3: Appointment observation: inter- and intra-observer reliability of scoring the communication style (proactive, reactive, or none) used by veterinary staff from 30 veterinary clinics in 152 appointments to discuss topics related to animal welfare, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Observer 1 vs. 4</th>
<th>Observer 1 vs. 5</th>
<th>Observer 1 vs. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic care and animal needs</td>
<td>0.54 [0.42-0.68]</td>
<td>0.53 [0.40-0.66]</td>
<td>0.73 [0.54-0.92]</td>
</tr>
<tr>
<td>Companionship</td>
<td>0.41 [0.15-0.68]</td>
<td>0.54 [0.24-0.85]</td>
<td>0.53 [0.10-0.97]</td>
</tr>
<tr>
<td>Animal behaviour</td>
<td>0.29 [0.09-0.49]</td>
<td>0.24 [0.02-0.45]</td>
<td>0.61 [0.31-0.92]</td>
</tr>
<tr>
<td>Behaviour issues</td>
<td>0.20 [-0.04-0.44]</td>
<td>0.27 [0.01-0.53]</td>
<td>0.19 [-0.16-0.53]</td>
</tr>
<tr>
<td>Appropriate training, handling</td>
<td>0.60 [0.38-0.82]</td>
<td>0.67 [0.49-0.85]</td>
<td>0.86 [0.59-1.00]</td>
</tr>
<tr>
<td>Veterinary preventive care</td>
<td>0.48 [0.34-0.63]</td>
<td>0.48 [0.34-0.62]</td>
<td>0.85 [0.70-1.00]</td>
</tr>
<tr>
<td>Transmissible, infectious diseases</td>
<td>0.61 [0.43-0.80]</td>
<td>0.69 [0.52-0.86]</td>
<td>0.63 [0.30-0.96]</td>
</tr>
<tr>
<td>Judging quality of life</td>
<td>0.30 [-0.03-0.62]</td>
<td>0.43 [0.05-0.81]</td>
<td>0.66 [0.03-1.00]</td>
</tr>
<tr>
<td>End of life and euthanasia</td>
<td>1.00 [1.00-1.00]</td>
<td>1.00 [1.00-1.00]</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>Chronic pain</td>
<td>0.62 [0.41-0.83]</td>
<td>0.57 [0.35-0.78]</td>
<td>0.83 [0.61-1.00]</td>
</tr>
<tr>
<td>Socialization to clinic, carrier, travel</td>
<td>0.07 [-0.15-0.30]</td>
<td>0.44 [0.18-0.70]</td>
<td>0.63 [0.25-1.00]</td>
</tr>
<tr>
<td>Alternatives to medically unnecessary procedures</td>
<td>-0.02 [-0.04-0.00]</td>
<td>0.19 [-0.15-0.54]</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>Pre-purchase, pre-breeding counselling</td>
<td>U</td>
<td>100</td>
<td>U</td>
</tr>
<tr>
<td>Appropriate sources for independent consultation</td>
<td>0.25 [-0.06-0.56]</td>
<td>0.27 [0.04-0.51]</td>
<td>1.00 [1.00-1.00]</td>
</tr>
<tr>
<td>All topics</td>
<td>0.61 [0.56-0.66]</td>
<td>0.64 [0.59-0.69]</td>
<td>0.80 [0.74-0.87]</td>
</tr>
</tbody>
</table>

Reliability is calculated based on the highest score for all veterinary staff members (veterinary technician and veterinarian) and 152 appointments (n = 48 appointments for observer 1 vs. 1).

Observer 1 = experienced observer; Observers 4 and 5 = trained, inexperienced observers

K\textsubscript{w} = weighted kappa

% Agree = raw percent agreement

U = uninformative: scores were the same value for each observer pair for all clinics; therefore, variability was too low to calculate weighted kappa statistics
Table 3.4: Appointment observation: inter- and intra-observer reliability of scoring the communication for all animal welfare topics combined used by veterinary staff from 30 veterinary clinics in 152 appointments, based on different scoring aggregations, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Scoring scale</th>
<th>Observer 1 vs. 4</th>
<th>Observer 1 vs. 5</th>
<th>Observer 1 vs. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
<td>$K_w$ [95% CI]</td>
</tr>
<tr>
<td>Veterinarian and owner combined (5-point scale)$^1$</td>
<td>0.69 [0.67-0.72]</td>
<td>80</td>
<td>0.71 [0.69-0.74]</td>
</tr>
<tr>
<td>Veterinarian only (5-point scale)</td>
<td>0.74 [0.71-0.77]</td>
<td>77</td>
<td>0.77 [0.74-0.80]</td>
</tr>
<tr>
<td>Owner only (5-point scale)</td>
<td>0.59 [0.54-0.63]</td>
<td>82</td>
<td>0.59 [0.54-0.63]</td>
</tr>
<tr>
<td>Staff and owner combined (3-point scale, highest score between staff members)$^2$</td>
<td>0.61 [0.56-0.66]</td>
<td>88</td>
<td>0.64 [0.59-0.69]</td>
</tr>
</tbody>
</table>

$^1$Reliability statistics based on 5-point scale (scores 1-5) for veterinarians and owners, pooled together.

$^2$Reliability statistics based on a 3-point scale (proactive/reactive/none), taking the score from the staff member (veterinary technician or veterinarian) with the highest score, and pooling staff and owner scores.

Observer 1 = experienced observer; Observers 4 and 5 = trained, inexperienced observers

$K_w$ = weighted kappa

% Agree = raw percent agreement
Table 3.5: Percentage of veterinary clinics that routinely discuss topics related to animal welfare during preventive veterinary appointments, by type of patient, according to questionnaire responses from veterinarians from 27 veterinary clinics.

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Puppies (/26)</th>
<th>Kittens (/27)</th>
<th>Dogs (/26)</th>
<th>Cats (/27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food type and amount</td>
<td>100%</td>
<td>100%</td>
<td>96%</td>
<td>96%</td>
</tr>
<tr>
<td>Body condition</td>
<td>92%</td>
<td>93%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Dental health</td>
<td>88%</td>
<td>85%</td>
<td>92%</td>
<td>93%</td>
</tr>
<tr>
<td>Exercise</td>
<td>77%</td>
<td>56%</td>
<td>77%</td>
<td>63%</td>
</tr>
<tr>
<td>New or ongoing behaviour problems</td>
<td>69%</td>
<td>63%</td>
<td>69%</td>
<td>63%</td>
</tr>
<tr>
<td>Mental stimulation</td>
<td>65%</td>
<td>63%</td>
<td>38%</td>
<td>41%</td>
</tr>
<tr>
<td>Prevention of behaviour problems</td>
<td>96%</td>
<td>93%</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td>Appropriate training</td>
<td>96%</td>
<td>89%</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Pain assessment and management</td>
<td>27%</td>
<td>26%</td>
<td>50%</td>
<td>48%</td>
</tr>
<tr>
<td>Cognitive decline</td>
<td>0%</td>
<td>0%</td>
<td>42%</td>
<td>41%</td>
</tr>
</tbody>
</table>

One veterinary clinic treated cats exclusively, thus responses for kittens and cats are based on 27 questionnaires and responses for puppies and dogs are based on 26 questionnaires.
Table 3.6: Measures of central tendency for the experienced observer’s scores for the communication of topics related to animal welfare based on responses to questionnaires by veterinarians from 27 veterinary clinics, responses to interviews by veterinarians from 30 veterinary clinics, and the communication by veterinary staff in 152 appointments from 30 veterinary clinics

<table>
<thead>
<tr>
<th>Data type</th>
<th>Discussion topic</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire</td>
<td>Food type and amount</td>
<td>3</td>
<td>3 – 3</td>
</tr>
<tr>
<td></td>
<td>Body condition</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Body condition</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Dental health</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Exercise</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>New or ongoing behaviour problems</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Mental stimulation</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Prevention of behaviour problems</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Appropriate training methods</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Pain assessment and management</td>
<td>3</td>
<td>3 – 3</td>
</tr>
<tr>
<td></td>
<td>Cognitive decline</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td>Interview</td>
<td>Veterinary preventive care</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Basic care and animal needs</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Judging quality of life</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>End of life and euthanasia</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Training and behaviour issues</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Animal behaviour: pain, stress, play</td>
<td>2</td>
<td>2 – 3</td>
</tr>
<tr>
<td></td>
<td>Companionship</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Appointment</td>
<td>Veterinary preventive care</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Basic care and animal needs</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Transmissible, infectious diseases</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Appropriate training, handling</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Chronic pain</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Behaviour issues</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Animal behaviour</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Socialization to clinic, carrier, travel</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Companionship</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Appropriate sources for independent consultation</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Judging quality of life</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>Alternatives to medically unnecessary procedures</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td></td>
<td>End of life and euthanasia</td>
<td>1</td>
<td>1 – 2</td>
</tr>
<tr>
<td></td>
<td>Pre-purchase, pre-breeding counselling</td>
<td>1</td>
<td>1 – 1</td>
</tr>
</tbody>
</table>

A score of 1 indicates no discussion, a score of 2 indicates reactive discussion, and a score of 3 indicates proactive discussion.
Table 3.7: Percentage of veterinary clinics that employed each communication style for the discussion of topics related to animal welfare, according to interview responses by veterinarians from 30 veterinary clinics

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Proactive</th>
<th>Reactive</th>
<th>None</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary preventive care(^1)</td>
<td>93%</td>
<td>7%</td>
<td>0%</td>
<td>-</td>
</tr>
<tr>
<td>Basic care and animal needs(^1)</td>
<td>57%</td>
<td>37%</td>
<td>7%</td>
<td>-</td>
</tr>
<tr>
<td>Judging quality of life(^2)</td>
<td>43%</td>
<td>11%</td>
<td>-</td>
<td>46%</td>
</tr>
<tr>
<td>End of life and euthanasia(^2)</td>
<td>29%</td>
<td>14%</td>
<td>-</td>
<td>57%</td>
</tr>
<tr>
<td>Training and behaviour issues(^1)</td>
<td>21%</td>
<td>66%</td>
<td>14%</td>
<td>-</td>
</tr>
<tr>
<td>Animal behaviour: pain, stress, play(^2)</td>
<td>15%</td>
<td>0%</td>
<td>-</td>
<td>85%</td>
</tr>
<tr>
<td>Companionship(^1)</td>
<td>13%</td>
<td>57%</td>
<td>30%</td>
<td>-</td>
</tr>
</tbody>
</table>

\(^1\)Communication for these topics was scored on a proactive/reactive/none scale, with reference to initiation of discussion.

\(^2\)Communication for these topics was scored on a proactive/issue/reactive scale, with reference to the animal’s health status, where issue refers to if an animal has an on-going health issue or concern and reactive refers to when action needs to be taken.
Table 3.8: Frequency distribution of veterinary clinics according to the percentage of all appointments in which their staff members engaged in proactive and reactive discussion of topics related to animal welfare, based on 152 appointments from 30 veterinary clinics

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Proportion of appointments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0- 20%</td>
</tr>
<tr>
<td>Veterinary preventive care</td>
<td></td>
</tr>
<tr>
<td>Basic care and animal needs</td>
<td></td>
</tr>
<tr>
<td>Transmissible, infectious diseases</td>
<td></td>
</tr>
<tr>
<td>Chronic pain</td>
<td></td>
</tr>
<tr>
<td>Companionship</td>
<td></td>
</tr>
<tr>
<td>Appropriate training, handling</td>
<td></td>
</tr>
<tr>
<td>Animal behaviour</td>
<td></td>
</tr>
<tr>
<td>Behaviour issues</td>
<td></td>
</tr>
<tr>
<td>Socialization to veterinary care</td>
<td></td>
</tr>
<tr>
<td>Judging quality of life</td>
<td></td>
</tr>
<tr>
<td>Appropriate sources for independent consultation</td>
<td></td>
</tr>
<tr>
<td>End of life and euthanasia</td>
<td></td>
</tr>
<tr>
<td>Alternatives to medically unnecessary procedures</td>
<td></td>
</tr>
<tr>
<td>Pre-purchase, pre-breeding counselling</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.9: Frequency distribution of veterinary clinics according to the percentage of wellness appointments in which their staff members engaged in proactive and reactive discussion of topics related to animal welfare, based on 83 appointments from 27 veterinary clinics

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Proportion of appointments</th>
<th>0-20%</th>
<th>21-40%</th>
<th>41-60%</th>
<th>61-80%</th>
<th>81-100%</th>
<th>Proactive</th>
<th>0-20%</th>
<th>21-40%</th>
<th>41-60%</th>
<th>61-80%</th>
<th>81-100%</th>
<th>Reactive</th>
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<tbody>
<tr>
<td>Veterinary preventive care</td>
<td></td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>14</td>
<td>21</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Basic care and animal needs</td>
<td></td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>13</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmissible, infectious diseases</td>
<td></td>
<td>17</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Appropriate training, handling</td>
<td></td>
<td>18</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic pain</td>
<td></td>
<td>19</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behaviour issues</td>
<td></td>
<td>20</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>17</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal behaviour</td>
<td></td>
<td>20</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>25</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socialization to clinic, carrier, travel</td>
<td></td>
<td>21</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Companionship</td>
<td></td>
<td>21</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>24</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate sources for independent consultation</td>
<td></td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Judging quality of life</td>
<td></td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Alternatives to medically unnecessary procedures</td>
<td></td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of life and euthanasia</td>
<td></td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Pre-purchase, pre-breeding counselling</td>
<td></td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>1</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>
CHAPTER FOUR

An evaluation of the pain assessment and management practices employed in companion animal veterinary practice

Abstract

Successful prevention, recognition and treatment of pain are integral for ensuring animal welfare among veterinary patients. An animal welfare assessment tool, incorporating management-based measures of animal welfare via verbal interviews with veterinarians, was developed to both assess and encourage pain management practices that safeguard and improve patient welfare. To assess the tool’s reliability, validity and feasibility, it was evaluated in thirty companion and mixed animal veterinary clinics. Based on weighted kappa statistics, interview scoring had substantial inter-observer ($K_w = 0.83, 0.73$; two inexperienced, trained observers vs. one experienced observer) and near-perfect intra-observer ($K_w = 0.92$; one experienced observer) agreement, suggesting that the tool reliably collects information concerning pain management practices. Moreover, the tool was reasonably feasible to use in veterinary clinics. Overall, for most interview questions, participating veterinary clinics scored across the full range of possible scores, suggesting that veterinary clinics vary in their approaches to pain management in ways that likely impact patient welfare. Descriptive results identified areas for which many veterinarians are acting in accordance with best practices for pain management (e.g. pre-emptive and post-surgical analgesia for ovariohysterectomy patients, post-surgical care instructions), and also highlighted areas that offer opportunity for enhancement (e.g. training veterinary staff to recognize signs of pain, duration of analgesia in ovariohysterectomy patients after they are
discharged). As a whole, most veterinarians appear to be effectively managing their patients’ pain.

**Key words:** animal welfare, companion animal, pain, veterinary practice, welfare assessment

**Introduction**

Many aspects of veterinary care have the potential to impact patient welfare, both within the veterinary clinic and in the animal’s home. On-farm animal welfare assessment schemes have been developed for most agricultural species (e.g. Welfare Quality®); however, similar assessment tools are not currently available for companion animals in the veterinary clinic setting. To begin the process of developing these assessment tools, a multi-stage survey was administered to companion animal veterinarians and animal welfare experts to identify veterinary care-related factors that impact canine and feline welfare (Dawson et al 2016). The optimization of analgesic regimes associated with surgical procedures as well as post-surgical and chronic pain control were amongst the identified factors considered to have the highest impact on patient welfare (Dawson et al 2016). To encourage veterinary clinics to adopt practices that optimize patient welfare, a trial welfare assessment tool for companion animal veterinary hospitals was developed, based on expert opinion as well as current scientific literature and veterinary pain management guidelines (Dawson et al 2016, Mathews et al 2014); the general process through which this tool was developed is outlined in Figure 3.1. Given its impact on companion animal welfare, a major subsection of this tool involves exploring veterinary approaches to managing canine and feline pain.
Pain encompasses both nociceptive and affective components; it includes the perception of pain and the subsequent feelings associated with being in pain (Reid et al 2013). As others have outlined, “pain is not just about how it feels, but how it makes you feel” (Mathews et al 2014; Reid et al 2013). The experience of being in pain is likely similar in vertebrate animals and humans, and has the potential to directly impair animal welfare. Some have suggested the suffering experienced by painful animals is amplified by the inability to comprehend the cause of their pain, and the inability to anticipate or even appreciate the possibility that it might end (Robertson 2002). Moreover, pain can also have detrimental effects on animal health, particularly on post-surgical recovery, resulting in extended veterinary hospital stays due to inappetence, self-injury and immune suppression causing an increased risk of infections (Hewson et al 2006a; Mathews 2000).

It is challenging to quantify the number of cats and dogs that are affected by pain; however, with approximately 7.9 million owned cats and 5.9 million owned dogs in Canada alone (Canadian Veterinary Medical Association 2011), a significant number of animals will undergo procedures, such as ovariohysterectomies and castrations, which can cause post-surgical pain if not managed appropriately. In addition, chronic pain often goes undiagnosed, thus prevalence is difficult to determine; however, estimates have suggested that 14% of all cats and 20% of all dogs are affected by chronic pain (Muir III et al 2004). Veterinarians consider osteoarthritis, a form of degenerative joint disease, to be the most common source of chronic pain in dogs, affecting 20% of all dogs over the age of one year (Bell et al 2014; Johnston 1997). As animals age, chronic pain due to osteoarthritis becomes increasingly common, with 90% of cats aged 12 years or older having some type of degenerative joint disease (Hardie et al 2002).
Effective pain management requires accurate identification of painful animals. As animals do not have the ability to self-report pain, identification is entirely dependent on the ability of a human observer to recognize and evaluate non-verbal signs of pain. It is, thus, not surprising that veterinarians consider the recognition of pain as one of the most significant barriers to effective pain management in their patients, especially for the control of chronic pain (Bell et al 2014). In fact, veterinarians and animal welfare experts consider the ability of veterinary clinic staff to recognize species-specific behavioural responses, such as pain, to be one of the top factors impacting companion animal welfare in relation to veterinary care (Dawson et al 2016). The detection of pain relies heavily on the recognition of subtle behavioural changes. Acute pain, due to trauma or surgery, is often predictable and might be more easily detected because of an obvious source. The recognition of chronic pain, however, is often less obvious, and relies more heavily on owners’ observation skills and the communication of their concerns to their veterinarian. The identification of pain in animals is further complicated by the fact that many pain-related behaviours, such as withdrawal, are also observed in fearful or anxious animals, and many patients are fearful or anxious in the veterinary clinic environment (Döring et al 2009, Glardon et al 2010, Mathews 2000). Moreover, veterinarians’ knowledge and attitudes also play an important role in the diagnosis and treatment of pain, both postoperatively and chronically. For example, gender and year of graduation from veterinary school have been found to impact veterinarians’ attitudes toward pain and their use of analgesics (Bell et al 2014, Capner et al 1999, Dohoo & Dohoo 1996b, Hewson et al 2006b, Hugonnard et al 2004, Williams et al 2005). This is likely to contribute to variation in pain management among veterinarians and veterinary clinics.
An ideal welfare assessment tool uses measures that are valid, reliable and feasible; it should accurately measure what it is attempting to measure (validity), provide data that lead to the same conclusion within and across observers (reliability), and allow for ease of measurement without excessive effort, time, or cost (feasibility) (Martin & Bateson 1993). The primary objective of this study was to assess the reliability and feasibility of the trial tool to assess animal welfare, specifically with regard to pain recognition and management, in companion animal veterinary hospitals. For the purposes of benchmarking, this study had a secondary objective of collecting information regarding current pain management practices, and comparing this information to published guidelines recommending best practices for pain management. This study will provide a basis for comparison of future research findings and allow for the tracking of changes in pain management practices over time.

**Materials and Methods**

This study was approved by the Research Ethics Board (REB #13JN017) and the Animal Care Committee (AUP #2272) at the University of Guelph. Detailed methods regarding clinic recruitment have been described previously (see Chapter 3). In brief, veterinary clinics were selected from a publically available, online listing through the College of Veterinarians of Ontario, the provincial veterinary regulatory body for Ontario. To have enough power to properly assess reliability, a sample size of 30 veterinary clinics was deemed necessary (Sim & Wright 2005). In order to recruit 30 veterinary hospitals, all hospitals that fit the selection criteria were invited (n = 474). The owner of every companion and mixed animal veterinary clinic located within 100 km of the University of Guelph received an invitation by mail; specialty, emergency, teaching, and humane society hospitals were excluded. Invitations were sent to six
veterinary clinics outside the 100 km radius, because staff members were previous research participants and had noted interest in participating in future studies. To encourage participation, a follow-up phone call was made within 14 days, and up to two follow-up phone calls and one follow-up email were sent to each clinic, until 30 veterinary clinics had been visited.

As part of a larger study, each participating veterinary clinic was visited in-person for a minimum of one full day. Verbal interviews, using open-ended questions and following a script, were conducted with either a clinic owner or another senior veterinarian, as deemed appropriate by veterinary clinic staff members. Interview questions were developed based on results from a previous study in which experts identified veterinary care-related factors that impact patient welfare (Dawson et al 2016). One section focused on various aspects of pain management, including the recognition of patient pain, staff and owner training, and perioperative analgesic regimes. Veterinarians were also asked about perioperative analgesic regimes for ovariohysterectomies, for which they were asked to retrieve veterinary records to aid with their responses. Interviews also covered a number of other topics that are discussed in detail in other manuscripts (i.e. veterinary-client communication regarding aspects of animal care and welfare, behavioural health, clinic management). As interviews focused on the evaluation of pain management practices, management-based measures of animal welfare were employed. Prior to data collection, interview questions were pilot tested with a veterinarian for comprehension, and no modifications were required. Although the majority of interviews were conducted in person, in three instances, veterinarians were unable to complete in-person interviews due to pre-scheduled clinical duties, and interviews were thus completed by telephone at a later date. Each interview was audio recorded using a Zoom H2n Handy Recorder (Zoom Corporation, Tokyo, Japan), and audio files were manually transcribed into text for analysis.
Responses were evaluated according to a scoring scheme based on published literature (World Small Animal Veterinary Association recommendations, Mathews et al 2014). Mathews et al 2014) and consultation with a veterinary anesthesiologist (Dr. Cornelia Mosley), who is board-certified by the American College of Veterinary Anesthesiologists. During development of the scoring scheme, a single, experienced observer (LD) scored five interview transcripts using a draft scoring scheme to determine its comprehensiveness and clarity. The draft scoring scheme was then modified accordingly to create a final scoring scheme that included sufficient detail to enable consistent scoring (see Table 4.1 for a simplified version, Appendix IX for the full final version). Most questions were scored on a three-point scale, representing ‘insufficient’ (score of 1), ‘acceptable’ (score of 2) and ‘excellent’ (score of 3) practices, respectively. For four questions, an adjustment to the score (+0.5) was possible (see adjustment column of Table 4.1); this was to encourage veterinary clinics to consider those practices that might be above and beyond best practices. For two questions (i.e. analgesia critical control points, provision of analgesics to surgical patients), it was only possible to distinguish between insufficient and acceptable practices; thus, responses were scored on a two-point scale. Interviews from all 30 veterinary clinics were completed prior to beginning any scoring.

To investigate inter-observer reliability, three observers independently scored all transcripts in random order. The experienced observer was a doctoral student in animal behaviour and welfare with experience in animal welfare assessment (observer 1, LD) and the two inexperienced observers were a master’s student in animal behaviour and welfare (observer 2) and an upper-year undergraduate Bachelor of Science student with an interest in animal welfare (observer 3). Prior to scoring, the two inexperienced observers underwent a training session led by the experienced observer. Training involved reviewing the scoring scheme,
independently scoring three transcripts, and reviewing scores verbally as a group. After training, the two inexperienced observers were permitted to ask the experienced observer for clarification about the scoring scheme until the end of the fifth interview, and not beyond this point, such that reliability could be properly assessed between independent observers. To assess intra-observer reliability, the experienced observer re-scored all interview transcripts a second time; this was done in a random order and with a minimum of six weeks between the first and second scoring to reduce the potential impact of recall.

Weighted kappa statistics, using exact Monte Carlo estimates and quadratic weighting, were computed using SAS 9.4 (SAS Institute Inc., Cary, NC, USA) to statistically assess inter- and intra-observer scoring reliability. Weighted kappa statistics were chosen to account for the degree of disagreement, whereby larger disagreements were penalized more than smaller disagreements along the ordinal scoring scale. These statistics were calculated at both the question and overall interview level (all questions pooled), based on pair-wise comparisons to the experienced observer (observer 1). Landis and Koch’s (1977) guidelines were used for interpretation: a weighted kappa ($K_w$) greater than 0.80 suggests almost perfect agreement, a $K_w$ between 0.61 and 0.80 suggests substantial agreement, a $K_w$ between 0.41 and 0.60 suggests moderate agreement, and a $K_w$ between 0.21 and 0.40 suggests fair agreement. Moreover, descriptive statistics were calculated at the question level, based only on the experienced observer’s scores, to derive frequencies, medians and ranges in scores for each question.

Results

Of the 474 veterinary clinics invited to participate, 41 (9%) agreed to be involved, 105 (22%) declined to participate, 209 (44%) did not provide a response to the invitation despite
multiple attempts to follow up by telephone and/or email, and 119 (25%) were not individually contacted to follow up because we had reached our target sample size of 30 veterinary clinics. Of the 41 clinics that agreed to be involved, the first 30 to schedule visits were those included in the study. Companion animal veterinary practices accounted for 80% (24/30) and mixed animal practices accounted for 20% (6/30) of all participating clinics. Participation rates were thus 6% for companion animal practices and 11% for mixed animal practices. Of the six invited veterinary clinics located outside the 100 km radius, five agreed to participate, and four of these clinics were mixed animal practices. All participating clinics treated cats, and all except one clinic treated dogs; five clinics (17%) were American Animal Hospital Association Accredited® and five clinics (17%) were participants in the American Association of Feline Practitioners Cat Friendly Practice® program.

Interviews were conducted with practice owners at 22 clinics (73%) and with a senior veterinarian at eight clinics (27%). Most of the interviews (77%, 23/30) were conducted with a female veterinarian. In three veterinary clinics, more than one veterinarian answered questions; although each question was only answered once per participating clinic, different individuals answered different sections of the interview, either because veterinarians noted that another staff member would be better suited to provide an answer, or for logistical reasons, such as limited time due to scheduled clinical duties.

Scoring reliability

Inter-observer reliability was relatively high overall (see Table 4.2 for weighted kappa statistics and 95% confidence intervals). When pooling values for all questions together, for each of the two inexperienced, trained observers compared to the experienced observer, raw percent
agreement was 85% and 82%, and weighted kappa was 0.83 and 0.73, reflecting almost perfect and substantial agreement. Inter-observer reliability was among the lowest for responses related to analgesic control points ($K_w = 0.47$ and $0.36$) and among the highest for responses related to perioperative analgesia for ovariohysterectomies ($K_w = 0.97$ and $0.86$). The graduate student observer (observer 2) had at least moderate agreement ($K_w > 0.40$, range $0.47-1.00$) with the experienced observer for all questions, with four of 13 questions having almost perfect agreement ($K_w > 0.80$). The undergraduate student observer's scoring (observer 3) was generally less consistent with the experienced observer’s, although it still showed at least fair agreement for each question ($K_w > 0.20$, range $0.33-0.86$).

Intra-observer reliability was higher than inter-observer reliability, with an overall raw percent agreement of 94% (range 87-100%, Table 4.2) and an overall weighted kappa statistic of 0.92, equating to almost perfect agreement ($K_w > 0.80$, Landis & Koch 1977); thus, intra-observer reliability showed a narrower range in these values than did inter-observer reliability. At the individual question level, weighted kappa statistics ranged from 0.66 to 0.99; similar to results for inter-observer reliability, scoring for responses to the question concerning analgesic control points was the least reliable, whereas scoring of responses for perioperative analgesia for ovariohysterectomies showed the highest reliability. Nevertheless, only one question showed below almost perfect agreement ($K_w < 0.80$), yet still remained above the threshold for substantial agreement ($K_w > 0.60$).

Descriptive statistics

No single aspect of pain assessment and management scored excellent (score = 3) for every veterinary clinic (Figure 4.1). However, practices regarding the provision of analgesics to
surgical patients, the development of a pain management plan, the provision of accessible information to owners after their pets had undergone surgery, and recognition of chronic pain in dogs scored acceptable (score = 2) or higher for every veterinary clinic (Figure 4.1, Table 4.3). The majority of veterinarians received a score of excellent in terms of providing owners with both oral and written post-surgical care instructions (97% of participants), and always following-up with pet owners, either by phone or via an in-clinic check, after routine elective ovariohysterectomies (96% of participants); the median score for these areas was 3 (Table 4.3). A majority (86%) of veterinarians indicated that they provide appropriate pre-emptive and post-surgical analgesia to patients undergoing ovariohysterectomies, earning a score of excellent in this area. However, some veterinarians (14%) also received insufficient scores since they reported that they do not provide pre-emptive analgesia. Conversely, very few veterinary clinics attained excellent scores for the methods used to recognize chronic pain in cats and dogs (only 3% of participating clinics use objective methods such as pain scales for dogs and no clinics used such pain scales for cats), or for providing analgesics for an appropriate duration after ovariohysterectomy. Only 10% of veterinary clinics reported prescribing pain relief for three days for feline patients and five days for canine patients.

No single aspect of pain assessment and management scored insufficient (score = 1) across every clinic. Areas with the greatest proportion of clinics categorized as insufficient included training staff to recognize pain in veterinary patients, providing appropriate analgesia to owners following ovariohysterectomies, and recognizing postoperative pain in dogs (Figure 4.1); across all participating clinics, 27% reported that they do not train their staff members to identify patient pain, 24% do not provide any analgesics to owners to administer to their pets for pain management at home after an ovariohysterectomy, and 21% rely on non-specific behavioural
signs, such as heart rate or vocalization, to identify post-surgical pain in dogs. Despite this, some veterinary clinics also received a score of excellent in these three areas. With the exception of four items (i.e. development of a pain management plan, provision of analgesics to surgical patients, form of information provided to owners, recognition of chronic pain in dogs), veterinary clinics scored across the full range of possible scores for each item (Table 4.3).

For four questions, a ‘bonus’ adjustment score was possible (Table 4.1). These assessment and management practices were used at a very low frequency, yet each was still employed by at least one participating veterinary clinic. A standardized, objective pain scale was routinely used to identify postoperative pain in cats and dogs by only 10% and 7% of veterinary clinics (3 and 2 clinics) respectively. During surgical patient discharge appointments, only 7% of veterinary clinics (2 clinics) demonstrated post-surgical instructions to owners, whereas 3% (1 clinic) used any form of local analgesia, such as line blocks at the incision site, during routine ovariohysterectomies.

**Discussion**

Both inter- and intra-observer reliability were generally high, showing at least substantial agreement overall according to weighted kappa statistics (Landis and Koch 1977). This suggests that scoring interview responses was dependable both between and within observers; thus, scoring by individuals with various backgrounds and levels of formal welfare training, and repeat scoring by one individual over time, should lead to similar conclusions concerning animal welfare in relation to pain management.

Intra-observer reliability was consistently higher than inter-observer reliability, both at the question and overall interview level. Although the current training program was effective at
maintaining an acceptable level of scoring reliability for most items, it might be further improved through modifications to the training regimen, or adjustments to the scoring scheme. Gibbons and colleagues (2012) were able to maintain a high level of inter-observer reliability for injury scores for dairy cows up to 15 weeks after initial training; to do this, they employed a training program involving a “refresher” session and two mid-point evaluations of repeatability statistics. We had a single training session prior to the start of scoring, and observers were only permitted to seek additional guidance up until the fifth interview was scored. In comparison to Gibbons et al. (2012), our scoring period was relatively short, taking place over three weeks, but a supplementary short training session at the mid-way point might have been useful for recalibrating all observers should any drift in scoring occur over time. While reliability assessment is important during tool development, high reliability would also be important to maintain consistency between observers as part of a formal assessment program, assuming a team of observers score interviews from different veterinary clinics. Furthermore, modification to the scoring scheme or the training program might yield improved inter-observer reliability. For instance, scoring was near perfect within the experienced observer for the development of a pain management plan, yet one pair of observers only reached fair agreement for responses to the same question. The experienced observer was involved in development of the scoring scheme, and likely had a better understanding of the details of it than those less familiar with it. Reliability was relatively high for most questions, suggesting that the scoring scheme adequately outlined scoring criteria for the type of responses routinely given by veterinarians.

Criteria for acceptable levels of reliability do not exist. If a weighted kappa value of 0.40 is arbitrarily set as a cut-off for inclusion, as has been suggested by Fleiss and colleagues (2003), all interview items would be retained in the welfare assessment tool. In other words, a minimum
weighted kappa statistic of 0.40 was obtained for at least one pair of observers for every interview question. Only a single question, asking about critical control points for the provision of analgesia for surgical procedures, showed relatively low reliability across all pairs of observers ($K_w = 0.47$ and 0.36 for two inexperienced vs. one experienced observer), including the experienced observer with repeat testing ($K_w = 0.66$). Despite this, raw percent agreement remained relatively high, at 93% and 83% agreement with the experienced observer and 93% agreement within the experienced observer. This discrepancy is likely due to nuances of the kappa statistic itself rather than issues with the assessment tool or scoring scheme; weighted kappa statistics become unreliable when variability is low or observations are rare or very common, so responses to this question were likely uniform, yielding similar scores across all veterinary clinics (Sim & Wright 2005, Viera & Garrett 2005). Furthermore, additional refinement of the scoring scheme for items with poor reliability is probably warranted. Test-retest reliability has not been assessed here, and further investigation of this is also warranted.

Although reliability tends to be given the highest importance when evaluating animal welfare assessment programs, it is also important to optimize feasibility and validity (Martin & Bateson 1993, Meagher 2009). In terms of feasibility, we were able to complete a full interview with at least one appropriate representative from every veterinary clinic. The current data on pain management are part of a larger research study that also includes video recording veterinary appointments and treatments. As such, it was necessary to visit each participating clinic to collect data for other aspects of this project, and in-person interviews were conducted with the majority of participants out of convenience rather than necessity. Completion of interviews by phone would also have been possible, and is unlikely to introduce any systematic bias. Since full interviews, including other sections not discussed here, can be completed in under an hour, they
do not require an unreasonable amount of time for participants. In a few cases interviews were successfully conducted by telephone, which is advantageous for scheduling according to the veterinarian’s preferences and availabilities. Phone interviews can also reduce the costs associated with traveling to each clinic, further increasing the feasibility of the tool. Moreover, for interview scoring, only a single two-hour training session and one follow-up session was necessary to reach an acceptable degree of reliability, even with an observer who had minimal formal animal welfare training. This suggests that observers can be adequately trained in a feasible amount of time, and that advanced welfare training is not necessary. As such, suitable observers could include those with an undergraduate science degree, veterinarians, or veterinary technicians.

Validity, or the extent to which a measure correctly assesses what it intends to assess, was not explicitly explored in this study, yet still warrants discussion (Martin & Bateson 1993). The assessment tool was developed based on results of a survey of animal welfare researchers and companion animal veterinarians; therefore, contents of the tool are expert validated. Moreover, the scoring scheme was based on published scientific evidence and guidelines in combination with expert opinion, adding to the tool’s validity. However, in some instances, scientific evidence to demonstrate that following published guidelines results in a measurable, positive effect on companion animal welfare is lacking. This is particularly true for differences between what we have deemed acceptable and excellent practices. For instance, it is unclear whether following up with owners after ovariohysterectomies significantly decreases patient pain compared to when owners are encouraged to contact the veterinary clinic if issues arise. For the most part, however, extensive research is available to inform the areas of pain assessment and management that are addressed in this tool. This is particularly true for examining the efficacy of
perioperative analgesic drugs (e.g. Slingsby and Waterman-Pearson 2000), and the timing of their administration (e.g. Ingwersen et al 2012), as well as identification of patient pain (e.g. Cambridge et al 2000). Thus, previous research has facilitated the development of a tool with valid content.

Another type of validity relates to the ability of the tool to produce interview responses that correspond to true pain management practices. Open-ended interviews provide veterinarians with the freedom to respond to questions at length, with more detail than would be possible via means like a questionnaire. On the other hand, social desirability, or the desire to provide responses that are deemed to be more generally acceptable, might bias responses during an interview, especially if conducted face-to-face with a researcher (Tourangeau & Yan 2007). In Chapter 3, veterinary-client content communication was investigated amongst the same population of veterinarians through questionnaires, interviews and appointment observation. Results indicated a mismatch between the level of communication outlined in interviews compared to the level of communication observed through veterinary appointments, suggesting that responses from interviews may not fully reflect reality. In this study, veterinarians might have provided the ‘right’ answers, or the answers that they believed researchers were searching for, regardless of whether they reflected reality; this would be especially likely if veterinarians were aware of their own deficiencies with respect to pain management. It is difficult to quantify the extent of this bias, and thus challenging to evaluate the validity of interviewing as a method to assess pain management. Interviews yielded a large range in responses, suggesting that they likely reflect the true state in veterinary clinics. Nonetheless, ideally, interview responses should be validated against actual practices, either through direct or video observation, or through verification of veterinary records. Direct observation was not feasible in this study, due to the
number of clinics involved. Observing an adequate number of surgical patients to properly assess perioperative pain management practices would have required more than a day long visit to each clinic, since many clinics do not perform surgeries on a daily basis, and this was not feasible given the sample size. If recording devices could have been left at veterinary clinics, collection of video evidence might have been more feasible, yet not without sacrifices to validity should staff members selectively record certain patients or situations. Significant time would also be required to analyze video recordings, and this was not feasible for this study, but could potentially be done in future studies to validate responses to some interview questions. Nonetheless, video observation would not have permitted the assessment or validation of analgesic regimes, for example. Examination of veterinary records would likely have been the best means to validate interview responses in this study. Client records are confidential documents, so assessors would be unable to retrieve these records themselves. Although we asked all clinics to pull veterinary records for their most recent ovariohysterectomy procedures, so that they could relate the exact drugs and doses provided, only three veterinarians were willing to do so. As such, it appears that assessment via patient records would not be well received by veterinarians; however, veterinarians might be less reluctant to discuss actual surgical records as part of an established welfare assessment program, so this could be an effective means of investigating this aspect of tool validity in the future.

All in all, the most direct way to assess pain management as it relates to animal welfare would be through the use of animal-based measures, such as an analysis of patient behaviour; if pain management is appropriate and effective, few inpatients should exhibit behaviours associated with pain. In order to properly assessing pain management in this manner, veterinary clinic visits would have to be scheduled on days when multiple surgeries were performed, and
this might not be feasible, especially if visits must also be scheduled on days with a sufficient number of veterinary appointments. Additionally, although animal-based measures would enable the assessment of post-surgical pain while the dog or cat remains within the veterinary clinic, it would be challenging to use these measures to assess pain control in the animal’s home environment. As such, although animal-based measures would have high validity, they could not entirely replace management-based measures for the assessment of pain management practices.

Since within- and between-observer scoring agreement were generally high, scoring for the current questions appears to be reliable, suggesting that descriptive statistics from this study are informative about current practices related to pain management in companion animal veterinary clinics. In terms of interview responses across all participating veterinary hospitals, no single area of pain management received either an excellent score, or an insufficient score. A high proportion of veterinary clinics received excellent scores for the provision of post-surgical care instructions, follow-up procedures after ovariohysterectomies, and the provision of pre-emptive and post-surgical analgesia to ovariohysterectomy patients. Moreover, all participating clinics indicated that they provide analgesics to every surgical patient, follow some sort of protocol when planning to manage pain induced by surgery, provide owners with at least oral instructions for post-surgical instructions regarding the care of their pet, and rely on pain-specific behaviours to diagnose chronic pain in their canine patients. This highlights areas in which the veterinary industry appears to be largely successful in following established best practices set out by veterinary organizations, such as the World Small Animal Veterinary Association.

With the overall objective of improving companion animal welfare in veterinary clinics through assessment and education, it is important to set criteria high enough to encourage progress and improvement, yet moderate enough to be attainable by at least some proportion
(e.g. 20-30%) of veterinary hospitals. Given that the ranges of scores for the majority of questions were wide and not limited to the lower end of the range, and no median scores were below two, it seems as though all criteria were attainable by the majority of participating veterinary clinics. In fact, criteria might perhaps be too relaxed, particularly for those aspects where a large majority reached the excellent threshold. Despite this, although many of these volunteer veterinary clinics were able to attain excellent scores, these items should still remain in the tool until the tool has been used to evaluate a broader population of veterinary clinics, after which time their inclusion could be re-evaluated; the pain management practices employed by participating veterinary clinics might not be representative of those employed in all veterinary clinics. Moreover, measures with little variation in responses might not be suitable for a welfare assessment program, as uniformity does not allow discrimination between clinics; if there is no variation in approaches to a certain aspect of pain management, then it does not offer any basis to separate ‘good’ clinics from those who are great. In this study, two aspects showed little variation in scoring: the provision of analgesics to surgical patients and the recognition of chronic pain in dogs; every veterinary clinic received identical scores for their responses to these two questions, and thus they do not offer any basis for discrimination between veterinary clinics. On the other hand, assessing these aspects of pain management could still be informative if converted to a different type of measure. For instance, review of records for the provision of analgesia might yield different, more discriminatory results than those provided through interviews. Moreover, scores for the recognition of chronic pain in dogs showed opportunity for enhancement, suggesting that it should be retained, regardless of low variability between veterinary clinics.
Conversely, if a large proportion of veterinary clinics score insufficient in any one area, or if very few veterinary clinics receive excellent scores, this would highlight aspects of pain management to prioritize in order to encourage improvement. Many of the participating veterinary clinics do not provide staff with training to recognize pain, since many noted that they expect most veterinarians and technicians to perfect these skills through their formal education. This could be a significant issue if veterinary and veterinary technician curriculums are lacking training regarding pain recognition, or if individuals that are responsible for pain management do not have any formal training. A survey of French veterinarians revealed that most veterinarians thought that their veterinary education did not provide them with adequate skills to assess nor manage pain in their patients, so reliance on sufficient prior training is likely insufficient (Hugonnard et al 2004). Participants from a 1994 survey of Canadian veterinarians noted that veterinary education was the least important source of information on pain recognition and treatment (Dohoo & Dohoo 1996a). At that time, there was likely a higher reliance on continuing education since veterinary curriculums might not have included much information on pain recognition and treatment. In the time since this study, veterinary curriculums have begun to include both more attention and information about pain and its treatment. Naturally, veterinary curriculums also differ by institution, further complicating the reliance on prior training. Hewson and colleagues (2006b) discovered that Canadian veterinarians who were graduates from certain veterinary schools, such as the Ontario Veterinary College and the Atlantic Veterinary College, were higher analgesic users than those who were trained through other institutions. Nonetheless, continuing education provides the opportunity to supplement veterinary education, and allows veterinarians to stay up to date on ever-improving analgesic practices in a manner not possible
through formal education alone. As such, a lack of in-clinic staff training might be mitigated through regular attendance at external continuing education training sessions.

The current results also suggest that a significant proportion of veterinarians do not provide an adequate duration of analgesia following ovariohysterectomy. Guidelines written by the World Small Animal Veterinary Association outline that post-ovariohysterectomy pain relief should be provided to cats and dogs for three and five days, respectively (Mathews et al 2014). Given the frequency with which ovariohysterectomies are performed, providing a shortened analgesic regime can potentially leave a large number of animals in pain. As Dohoo and Dohoo (1996a) have noted, this highlights the importance of not only providing analgesia, but the importance of providing analgesia at appropriate dosing intervals and for suitable durations for effective postoperative pain management. Furthermore, inadequate provision of analgesics can also leave pet owners with unmet expectations. An investigation of post-surgical analgesic use in Great Britain found that 61% of pet owners expect analgesics to be sent home with their pet following surgery, yet only 18% of veterinary clinics did so routinely (Demetriou et al 2009). A survey of more than 600 veterinarians working in the United Kingdom, Australia and New Zealand revealed a similar phenomenon: although veterinarians were effective at managing patient pain following ovariohysterectomies and castrations while patients remained in the clinic, only 16% provided analgesia post-discharge for twenty-four hours or more (Farnworth et al 2014). As such, current results confirm that current analgesic practices might leave a number of cats and dogs in preventable pain post-ovariohysterectomy, particularly upon discharge and return home with their owners.

Furthermore, a significant proportion of veterinary clinics participating in the current study used insufficient methods to recognize pain; many indicated that they rely primarily on
non-specific behavioural signs to identify postoperative pain in canine patients, with few making use of objective pain scales to identify both post-surgical and chronic pain in cats and dogs (e.g. the Glasgow Short Form Composite Measure Pain Scale, Reid et al 2007; the Helsinki Chronic Pain Index, Hielm-Björkman et al 2009). Pain identification is the cornerstone of effective pain management, and the use of ineffective methods to identify pain might leave many animals in pain, despite the use of appropriate analgesic regimes; animals vary in their response to procedures, so standard analgesic dosages might be insufficient to fully mitigate pain. If used correctly and systematically, validated pain scales can aid in ensuring that the decision-making process involved with prescribing analgesics is more objective, and can mitigate the potentially detrimental effects of the veterinarian’s attitude (Doohoo & Dohoo 1996a, Mathews et al 2014). In humans, practitioners’ use of a paper pain assessment form was shown to lead to an increase in the use of analgesics and improved control of patients’ pain (Baillie 1993). Based on results from previous research, this under-use of objective methods for pain assessment is not surprising; 73% of French veterinarians did not use pain scales and 58% admitted to restricting the prescription of analgesics due to difficulty in recognizing pain (Hugonnard et al 2004). On the positive side, each of these weak areas also had at least some veterinary clinics receiving excellent scores. It is also possible that fewer individuals would have scored insufficiently, or more individuals would have scored excellent, if questions had been asked in a different way. Directly asking about the use of an objective scoring scheme for the recognition of chronic pain, for example, might have elicited an increased number of excellent responses than were obtained through an open-ended question if veterinarians, for instance, did not think to discuss using pain scales when asked about the appearance of a chronically painful cat or dog. On the other, responses to closed-ended questions would be less valid, as veterinarians are likely to respond
positively when provided with the ‘right’ answer. Since some clinics have been able to successfully implement excellent practices, it should be possible to improve these areas of pain management through enhanced training and continuing education opportunities for veterinarians and other staff involved in pain management.

As with any study, results and the conclusions drawn from them are constrained by certain limitations. In order to recruit a sufficient number of veterinary clinics, it became necessary to invite all local animal hospitals that fit the selection criteria, resulting in a non-random sample. Furthermore, since participation was entirely voluntary, non-response and self-selection bias might have impacted the results; those who were willing to participate in this study might not be representative of the larger population of veterinary clinics in southwestern Ontario, and might consequently be inherently different than those who did not participate, in terms of demographics, practices or attitudes towards pain management. Without demographic information for the greater population, it is difficult to quantify the extent of these biases. Multiple studies have demonstrated that both year of graduation and gender have an impact on attitudes towards pain management, whereby more recent graduates (within the last decade) and females are more likely to provide analgesics to their patients post-surgically (e.g. Capner et al 1999, Dohoo & Dohoo 1996b, Hewson et al 2006b, Hugonnard et al 2004, Williams et al 2005). The majority of participating veterinarians were female, and they might have thus been more likely to use analgesics than male veterinarians. On the other hand, many were also practice owners, suggesting that they were less likely to have graduated within the last ten years. Nonetheless, as pain assessment and management have received increased attention in veterinary curricula, the effect of year of graduation is likely to decrease over time as a larger proportion of practicing veterinarians graduate having been exposed to newer developments in pain
management strategies. Additionally, the sample encompassed veterinarians working exclusively with small animals as well as in mixed animal practices, in both urban and rural settings, and thus, included veterinarians working in a variety of settings. A limited number of clinics were enrolled in voluntary accreditation programs (i.e. American Animal Hospital Association accreditation, Cat Friendly Practice® program). Although this indicates an increased interest and commitment to providing a higher standard of care for these clinics, the majority of clinics were not participants in these programs, and the proportion of participating clinics enrolled in these programs was similar to national enrollment statistics (e.g. 5/30 clinics AAHA Accredited® versus an estimated 12-15% of hospitals across Canada and the United States; American Animal Hospital Association 2016). Additionally, senior veterinarians, particularly clinic owners, should ideally be aware of and familiar with their veterinary clinic’s procedures and practices with regards to pain management, and should be able to act as a representative of their clinic. In reality, however, different veterinarians can take different approaches, or have individual attitudes or preferences that do not accurately reflect all aspects of the clinic’s practices. Hence, the use of a single individual to represent an entire clinic’s approach to pain management might be biased. Finally, although these limitations might have impacted results in terms of descriptive statistics, they should have nonetheless had minimal detrimental effect on the evaluation of the tool itself, as scoring reliability does not depend on the specific content of the response, but rather the ability of different observers to score a response in a similar way. Moreover, for most items, there was variation in scoring across the sample of veterinary clinics, with most veterinarians scoring well overall.

This animal welfare assessment tool, including the scoring scheme for interview responses, was developed based on a combination of expert opinion, scientific evidence and
published guidelines for best practices. Despite this, there is some variation in expert opinion with regards to certain aspects of pain management (e.g. use of NSAIDs versus opioids pre-surgically), and results might differ slightly if the scoring scheme were modified to reflect other opinions. Moreover, one of the main documents used, titled “Guidelines for recognition, assessment and treatment of pain” and developed by the World Small Animal Veterinary Association, was published in 2014, while a portion of the interviews for the current study were completed before it was released. Thus, some veterinary staff might not have been aware of the recommendations that we have deemed to be best practice when developing the scoring scheme. However, Mathews et al (2014) largely collates a variety of past scientific studies, without presenting much new information.

In summary, the pain assessment tool developed and evaluated through this study appears to have a good level of inter- and intra-observer reliability, and is also feasible to use in the veterinary clinic setting. Validity requires further investigation, and future research should focus on validating that interview responses regarding pain assessment and management are a good proxy for what actually happens in veterinary clinics; although reliability and practicality are high, if the tool is not measuring what it intends to measure, then it will not be effective in terms of assessing and improving patient welfare with respect to pain control. Overall, veterinary clinics scored across the full range of possible scores for the majority of questions, suggesting a wide range in approaches to pain assessment and management between veterinary clinics. Moreover, although results identify aspects of pain management that could benefit from further attention and enhancement, they also highlight a number of areas for which at least some veterinary clinics are acting in accordance with best practices, and suggest that as a whole, many
veterinarians and veterinary staff are doing an adequate if not excellent job at managing their patients’ pain.
References

Bell, A., Helm, J., Reid, J. 2014. Veterinarians’ attitudes to chronic pain in dogs. The Veterinary Record, 175(17), 428.


Table 4.1: Simplified scoring scheme for veterinarians’ responses to interview questions regarding pain assessment and management

<table>
<thead>
<tr>
<th>Question</th>
<th>Excellent (3)</th>
<th>Acceptable (2)</th>
<th>Insufficient (1)</th>
<th>Adjustment (0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesia critical control points*</td>
<td>-</td>
<td>Before and/or during surgery</td>
<td>After surgery or none</td>
<td>-</td>
</tr>
<tr>
<td>Development of pain management plan</td>
<td>Individualized</td>
<td>Standard protocol</td>
<td>No protocol</td>
<td>-</td>
</tr>
<tr>
<td>Form of information provided to owners</td>
<td>Written and oral</td>
<td>Oral only</td>
<td>Written only</td>
<td>Demonstration</td>
</tr>
<tr>
<td>OVH: analgesics provided to owner</td>
<td>3 or more days for cats, 5 or more days for dogs</td>
<td>2 or less days for cats, 4 or less days for dogs</td>
<td>None</td>
<td>-</td>
</tr>
<tr>
<td>OVH: follow-up with owner</td>
<td>Phone call or check</td>
<td>Encourage owner to contact if questions or issues</td>
<td>No follow-up</td>
<td>-</td>
</tr>
<tr>
<td>OVH: perioperative analgesia</td>
<td>Pre- (opioids) and postsurgery (opioids, NSAIDs)</td>
<td>Pre-surgery (opioids)</td>
<td>During or after surgery, or none</td>
<td>Local analgesics</td>
</tr>
<tr>
<td>Provision of analgesics to surgical patients*</td>
<td>-</td>
<td>All surgical patients</td>
<td>Not all surgical patients</td>
<td>-</td>
</tr>
<tr>
<td>Recognition of chronic pain in cats</td>
<td>Objective scoring scheme</td>
<td>Subjective: pain-specific behaviour</td>
<td>Subjective: non-specific behaviour</td>
<td>-</td>
</tr>
<tr>
<td>Recognition of chronic pain in dogs</td>
<td>Objective scoring scheme</td>
<td>Subjective: pain-specific behaviour</td>
<td>Subjective: non-specific behaviour</td>
<td>-</td>
</tr>
<tr>
<td>Recognition of postoperative pain in cats</td>
<td>Behaviour through interaction</td>
<td>Behaviour at distance</td>
<td>Non-specific behaviour</td>
<td>Use of pain scale</td>
</tr>
<tr>
<td>Recognition of postoperative pain in dogs</td>
<td>Behaviour through interaction</td>
<td>Behaviour at distance</td>
<td>Non-specific behaviour</td>
<td>Use of pain scale</td>
</tr>
<tr>
<td>Training owners to recognize pain</td>
<td>Written and oral</td>
<td>Written only</td>
<td>Do not train owners</td>
<td>-</td>
</tr>
<tr>
<td>Training staff to recognize pain</td>
<td>Formal training</td>
<td>Informal training</td>
<td>No training</td>
<td>-</td>
</tr>
</tbody>
</table>

* = aspects of pain management were scored on a two-point scale (insufficient/acceptable)
OVH = ovariohysterectomy
- = not applicable
Table 4.2: Inter- and intra-observer reliability of scoring responses given by veterinarians from 30 veterinary clinics to interview questions regarding pain assessment and management, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Question</th>
<th>Observer 1 vs. 2</th>
<th></th>
<th>Observer 1 vs. 3</th>
<th></th>
<th>Observer 1 vs. 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>K_\omega [95% CI]</td>
<td>% Agree</td>
<td>K_\omega [95% CI]</td>
<td>% Agree</td>
<td>K_\omega [95% CI]</td>
<td>% Agree</td>
<td></td>
</tr>
<tr>
<td>Analgesia critical control points</td>
<td>0.47 [-0.13-1.00]</td>
<td>93</td>
<td>0.36 [-0.07-0.79]</td>
<td>83</td>
<td>0.66 [0.24-1.00]</td>
<td>93</td>
</tr>
<tr>
<td>Development of pain management plan</td>
<td>0.65 [0.44-0.85]</td>
<td>73</td>
<td>0.33 [-0.05-0.71]</td>
<td>77</td>
<td>0.92 [0.82-1.00]</td>
<td>90</td>
</tr>
<tr>
<td>Form of information provided to owners</td>
<td>0.77 [0.66-0.88]</td>
<td>90</td>
<td>0.41 [-0.14-0.97]</td>
<td>93</td>
<td>0.83 [0.76-0.91]</td>
<td>97</td>
</tr>
<tr>
<td>OVH: analgesics provided to owner</td>
<td>0.92 [0.81-1.00]</td>
<td>93</td>
<td>0.73 [0.44-1.00]</td>
<td>85</td>
<td>0.93 [0.81-1.00]</td>
<td>96</td>
</tr>
<tr>
<td>OVH: follow-up with owner</td>
<td>1.00 [1.00-1.00]</td>
<td>100</td>
<td>0.79 [0.42-1.00]</td>
<td>93</td>
<td>0.81 [0.45-1.00]</td>
<td>96</td>
</tr>
<tr>
<td>OVH: perioperative analgesia</td>
<td>0.97 [0.92-1.00]</td>
<td>93</td>
<td>0.86 [0.64-1.00]</td>
<td>85</td>
<td>0.99 [0.98-1.00]</td>
<td>96</td>
</tr>
<tr>
<td>Provision of analgesics to surgical patients</td>
<td>U</td>
<td>87</td>
<td>U</td>
<td>87</td>
<td>U</td>
<td>100</td>
</tr>
<tr>
<td>Recognition of chronic pain in cats</td>
<td>0.79 [0.50-1.00]</td>
<td>93</td>
<td>0.66 [0.29-1.00]</td>
<td>90</td>
<td>0.90 [0.71-1.00]</td>
<td>97</td>
</tr>
<tr>
<td>Recognition of chronic pain in dogs</td>
<td>U</td>
<td>97</td>
<td>U</td>
<td>93</td>
<td>U</td>
<td>100</td>
</tr>
<tr>
<td>Recognition of postoperative pain in cats</td>
<td>0.85 [0.67-1.00]</td>
<td>87</td>
<td>0.84 [0.68-1.00]</td>
<td>87</td>
<td>0.99 [0.97-1.00]</td>
<td>97</td>
</tr>
<tr>
<td>Recognition of postoperative pain in dogs</td>
<td>0.57 [0.25-0.88]</td>
<td>72</td>
<td>0.60 [0.34-0.87]</td>
<td>72</td>
<td>0.85 [0.64-1.00]</td>
<td>93</td>
</tr>
<tr>
<td>Training owners to recognize pain</td>
<td>0.63 [0.36-0.90]</td>
<td>67</td>
<td>0.45 [0.20-0.70]</td>
<td>63</td>
<td>0.90 [0.78-1.00]</td>
<td>87</td>
</tr>
<tr>
<td>Training staff to recognize pain</td>
<td>0.80 [0.63-0.98]</td>
<td>80</td>
<td>0.67 [0.44-0.90]</td>
<td>67</td>
<td>0.96 [0.90-1.00]</td>
<td>93</td>
</tr>
<tr>
<td>Overall</td>
<td>0.83 [0.78-0.89]</td>
<td>85</td>
<td>0.73 [0.65-0.82]</td>
<td>82</td>
<td>0.92 [0.87-0.97]</td>
<td>94</td>
</tr>
</tbody>
</table>

Observer 1 = experienced observer, Observers 2 and 3 = trained, inexperienced observers
OVH = ovariohysterectomy
K_\omega = weighted kappa
% Agree = raw percent agreement
U = uninformative: not enough variation in responses to calculate a kappa statistic
* = aspects of pain management were scored on a two-point scale (insufficient-acceptable); thus, it was not possible to receive a score of excellent
Table 4.3: Measures of central tendency for the experienced observer’s scores for responses to interviews with veterinarians from 30 veterinary clinics, regarding pain assessment and management

<table>
<thead>
<tr>
<th>Question</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesic critical control points*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Development of pain management plan</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td>Form of information provided to owners</td>
<td>3</td>
<td>2 – 3.5</td>
</tr>
<tr>
<td>OVH: analgesics provided to owner</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td>OVH: follow-up with owner</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td>OVH: perioperative analgesia</td>
<td>3</td>
<td>1 – 3.5</td>
</tr>
<tr>
<td>Provision of analgesics to surgical patients*</td>
<td>2</td>
<td>2 – 2</td>
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<tr>
<td>Recognition of chronic pain in cats</td>
<td>2</td>
<td>1 – 3</td>
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<td>Recognition of chronic pain in dogs</td>
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<tr>
<td>Recognition of postoperative pain in cats</td>
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<td>1 – 3.5</td>
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<tr>
<td>Recognition of postoperative pain in dogs</td>
<td>2</td>
<td>1 – 3</td>
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<tr>
<td>Training owners to recognize pain</td>
<td>2</td>
<td>1 – 3</td>
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<tr>
<td>Training staff to recognize pain</td>
<td>2</td>
<td>1 – 3</td>
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</tbody>
</table>

Score of 1 = insufficient, 2 = acceptable, 3 = excellent
OVH = ovariohysterectomy
* = aspects of pain management were scored on a two-point scale (insufficient – acceptable); thus, it was not possible to receive a score of excellent
Figure 4.1: Frequency distribution of veterinarians from 30 veterinary clinics according to their interview response scores to questions concerning pain assessment and management

* = aspects of pain management were scored on a two-point scale (insufficient-acceptable); thus, it was not possible to receive a score of excellent

OVH = ovariohysterectomy
CHAPTER FIVE

An evaluation of the canine and feline behavioural health practices employed in companion animal veterinary practice

Abstract

Veterinary care can both positively and negatively impact animal welfare in terms of behavioural health. This occurs both in the veterinary clinic through interactions with patients and management of their stress, fear and aggression, and in the animal’s home through the provision of behaviour and training advice for behavioural management as a whole. An animal welfare assessment scheme, incorporating management-, resource- and animal-based measures of animal welfare through interviews and appointment observations, was developed to assess practices related to behavioural health in small animal veterinary clinics. It was tested for reliability, validity, and feasibility in 30 companion and mixed animal veterinary clinics, where information concerning current behavioural health practices was also collected. Based on weighted kappa statistics, inter-observer reliability showed almost perfect agreement for interview scoring ($K_w = 0.82$ and $0.81$) and substantial agreement for appointment observation scoring ($K_w = 0.74$ and $0.70$); however, at the individual question and handling item level, weighted kappa statistics for inter-observer reliability ranged greatly. Interviews were more feasible to carry out than appointment observations, although discrepancies between interview responses and veterinary staff-patient interactions observed during appointments suggest that interviews might be a less valid measure. Descriptive results highlight a number of areas in which veterinary clinics are performing well (e.g. the confidence of veterinarians to advise
clients regarding behaviour problems); however, they also suggest that there is opportunity for enhancement in other areas (e.g. the use of diverse handling techniques).

Key words: animal welfare, behaviour, cat, companion animal, dog, handling, veterinary practice, welfare assessment

Introduction

Veterinarians influence the behavioural health and welfare of their patients, both through human-animal interactions in the clinic environment, and through the provision of information for behavioural management in the animal’s home. In recognition of this, veterinary organizations (e.g. the American Association of Feline Practitioners (AAFP), the American Animal Hospital Association (AAHA)) have published guidelines for the behavioural management of patients, both while in the veterinary clinic and in terms of behavioural advice to pet owners. However, assessment programs that specifically evaluate animal welfare in veterinary clinics, including practices related to behavioural health, do not exist. As a first step to the development of such a program, animal welfare researchers and practicing veterinarians were surveyed regarding veterinary care-related factors thought to impact canine and feline welfare (Dawson et al 2016). Results suggested behavioural health as a main theme, including aspects such as the recognition and interpretation of animal behaviour, handling and restraint, and the provision of guidance to the owner regarding behaviour in the animal’s home.

Although receiving veterinary care is vital to the maintenance of animal health and welfare, the visit itself can be an unpleasant experience for patients. Many dogs and cats exhibit behavioural signs of fear and stress in various areas of the veterinary clinic, suggesting that their welfare can be impaired by veterinary visits. One study found that 70% of dogs visiting the
veterinarian for routine physical examinations were reluctant to enter the veterinary clinic (Stanford 1981). Another study that focused solely on the waiting room categorized 53% of dogs as stressed on the basis of displaying four or more signs of stress, including lip licking and yawning (Mariti et al 2015). Further, Döring and colleagues (2009) found that 78% of dogs were categorized as fearful during at least part of their veterinary visit on the basis of displaying at least three behavioural indicators of fear (e.g. body posture, tail position, avoidance behaviour), with the largest proportion of dogs exhibiting signs of fear on the examination table. Cats and young patients show similar fear responses to standard head-to-tail physical examinations (Glardon et al 2010, Godbout et al 2007). Moreover, as many as 80% of healthy canine patients awaiting surgery exhibit behavioural signs of fear (Väisänen et al 2005).

Although reducing fear and stress is important for ensuring patient welfare, these negative experiences can also have additional undesirable consequences. Fearful patients tend to be less cooperative, and thus, can require additional time, effort, and staff members, decreasing both efficiency and productivity for the practice (Anseeuw et al 2006, Rodan et al 2011). If forced to endure examination and treatment, fearful patients might also become aggressive, increasing the risk of injury to veterinary staff members (Herron & Shreyer 2014, Moffat 2008). Since negative experiences condition animals, fearful or stressed patients can also be increasingly fearful or uncooperative during future veterinary visits if their fear or stress is not properly managed (Simpson 1997). Stress can also limit veterinarians’ abilities to properly evaluate and diagnose medical conditions, because animals can be difficult to examine, and stress impacts physiological parameters. For instance, feline blood pressure, heart rate and blood glucose concentration taken in the clinic environment differ from those taken in the animal’s home or over 24-hour monitoring periods (Belew et al 1999, Nibblett et al 2015, Quimby et al
Moreover, physical restraint alters parameters such as heart rate (Beerda et al 1998), and reducing patient stress leads to more accurate results from diagnostic laboratory testing and improves medical diagnosis (Herron & Shreyer 2014, Overall & Mills 2012). Finally, one of the top client-driven factors explaining the recent decline in veterinary visits is the stress associated with visiting the veterinarian, with 58% of cat owners and 38% of dog owners citing this as a reason for less frequent veterinary visits (Volk et al 2011).

As primary care providers, general practitioners are also in a position to influence their patients’ behavioural health at home. Pet owners are more likely to consult a veterinarian than an animal behaviourist to address behaviour problems, highlighting both an expectation of, and an opportunity for, veterinary staff (Shore et al 2008). Unaddressed behaviour problems, such as aggression, can compromise human safety, have negative consequences for the human-animal bond, and increase euthanasia rates and the chances of relinquishment to a shelter (Patronek et al 1996, Shore 2005). Veterinarians can aid in the prevention and treatment of behaviour problems, through both client education and referral to appropriate behaviour professionals for additional support when necessary. Others have emphasized the importance of providing behaviour advice to pet owners, suggesting that every veterinarian should educate owners about basic animal behaviour and training (Landsberg et al 2008). In fact, the early provision of behaviour advice to puppy and kitten owners has been shown to limit the development of behavior issues later in life for both species (Gazzano et al 2008, Gazzano et al 2015). It is, thus, important to encourage veterinarians to incorporate behavioural wellness into their everyday practice (Hetts et al 2004).

The primary objective of this study was to develop and evaluate a tool for the assessment of behavioural health related to veterinary care. More specifically, the reliability, validity and feasibility of different types of measures were evaluated through visits to companion and mixed
animal veterinary clinics in order to identify the most appropriate measures to assess veterinary-related animal welfare with regard to reducing animal fear and stress during veterinary appointments, and improving behavioural health in the home environment. As a secondary objective, current behavioural health practices were investigated to assess variability in practices between clinics, while simultaneously serving as a basis for comparison with future improvement and progress.

**Materials and Methods**

This chapter describes a section of a larger assessment tool that evaluates overall companion animal welfare in relation to veterinary care, including other aspects not investigated here (e.g. content communication, pain management). The process through which this overall assessment tool was developed is described in Figure 3.1.

**Ethical approval**

This study was approved by the Research Ethics Board (REB #13JN017) and the Animal Care Committee (AUP #2272) at the University of Guelph.

**Hospital recruitment**

Details regarding clinic recruitment are described more thoroughly elsewhere (Chapter 3). In short, veterinary clinics were selected from a publically available, online listing accessible through Ontario’s veterinary governing body (the College of Veterinarians of Ontario, CVO). In order to be eligible to participate, veterinary clinics had to be within 100 km of the University of Guelph, not mainly a specialty or emergency clinic, not associated with a teaching facility or
humane society, and had to devote at least 50% of the practice to the treatment of companion animals, based on their classification by the CVO. Invitations were addressed to the clinic owner and mailed to 474 veterinary clinics. Invited clinics were followed up via telephone, and e-mail when possible, until a total of 30 veterinary clinic visits were scheduled; in order to recruit enough veterinary clinics to meet this goal, it became necessary to invite all those that fulfilled the inclusion criteria.

Clinic visits were initially scheduled on days that would enable the capture of six veterinary appointments (three canine, three feline), with the exception of planned euthanasia or recheck appointments. A number of veterinary clinics were unable to accommodate this; therefore, partway through the study, visits began to be scheduled on days with at least three veterinary appointments scheduled, regardless of species, but still excluding euthanasia and recheck appointments.

*Interview*

Verbal interviews were conducted with one representative per clinic; this was usually the clinic owner; however, in some instances the owner designated another senior veterinarian to complete the interview. Interviews employed open-ended questions and followed a script. As interviews focused on the evaluation of behavioural health practices, management-based measures of animal welfare were employed. Questions were developed based on results from a previous study (Dawson et al 2016), which determined aspects of veterinary medicine that might impact companion animal welfare, and were tested for veterinarian comprehension through a pilot interview. No modifications were required after this pilot test. Although the current study focuses on behavioural health, interviews also covered other topics not discussed here (i.e.
communication, pain management, clinic management). Interviews were largely conducted face-to-face with a member of the research team (LD and/or a research assistant). Interviews were completed at the convenience of the participant, and were, thus, completed at various times with respect to appointment observations. When required, some interviews were completed in part or in full via telephone because some veterinarians were unavailable during the day of the visit. Interviews were audio recorded using an audio recorder (Zoom H2next Handy Recorder, Zoom Corporation, Tokyo, Japan) and manually transcribed for scoring.

Responses were scored according to a scoring scheme that was developed from our previous study examining expert-identified factors important to welfare in relation to veterinary care (Dawson et al 2016), and other published literature outlining best veterinary practices with regard to patient behavioural health and management (i.e. Anseeuw et al 2006, Hammerle et al 2015, Herron et al 2014, Rodan 2010, Rodan et al 2011). The scoring scheme was initially assessed for comprehensiveness and clarity by testing it on a subsample of interviews. Modifications were made following the assessment of raw percentage agreement between an experienced (observer 1, LD) and an inexperienced observer (observer 2) to ensure it included enough detail to allow for accurate scoring. A simplified version of the final scoring scheme is outlined in Table 5.1 and the complete scoring scheme is provided in Appendix X. Most responses were scored on a three-point scale. A score of 3 indicated an excellent response, in line with current best practices, a score of 2 indicated an acceptable response, reflecting standard satisfactory practices, and a score of 1 indicated an insufficient score. For four questions, an additional half-point bonus or penalty was possible. Bonuses were assigned for the use of practices beneficial, but not necessary, to maximize patient behavioural health, and penalties were assigned to practices detrimental to behavioural health, regardless of whether beneficial
practices were also used. Cat handling questions were scored on a two-point scale, reflecting the frequency with which they were employed (i.e. routinely or usually vs. rarely or in limited situations).

Three observers, one experienced (observer 1) and two inexperienced observers (observers 2 and 3) independently scored all transcripts. The experienced observer was a doctoral student in animal behaviour and welfare with experience in animal welfare assessment, and the two inexperienced observers were a master’s student in animal behaviour and welfare and an upper-year undergraduate science student with an interest in animal welfare. Prior to scoring, a training session, led by the experienced observer, was conducted to familiarize the inexperienced observers with the scoring scheme. During this training session, the experienced observer thoroughly reviewed the scoring scheme, interview transcripts were reviewed, and scores were discussed as a group. Following the training session, observers were permitted to clarify any aspect of the scoring scheme up until the fifth interview had been scored, after which all scoring had to be completed fully independently. All interviews were scored at the end of the data collection period and in a random order, to reduce any effects of order on scoring. The experienced observer also scored every interview on a second occasion, in a random order, at least eight weeks after the initial round of scoring; the eight-week delay was intended to mitigate any effects of memory on scoring outcomes.

Appointment observation

Video cameras (Sony Handycam HDR-CX220, Sony Corporation, Tokyo, Japan) were mounted on small, flexible tripods (Joby GorillaPod SLR-Zoom, JOBY, Petaluma, CA, USA) and unobtrusively installed in exam rooms. At least two cameras were installed per room, to
capture multiple angles and as much of the room as possible, with particular attention to the examination table and the floor. A member of the research team approached all pet owners visiting the clinic for the purpose of a consultation with a veterinarian, including the owners of pets with recheck appointments, with the exception of pet owners who veterinary staff mentioned were scheduled for planned or potential euthanasia appointments. Pet owners were provided with a basic description of the study, and if owners were willing to participate, written consent was obtained in the waiting room, prior to entry into the examination room. The researchers were not present in the examination room, and appointments were carried out as normal, with the exception of the presence of the video cameras.

Various aspects of staff handling were scored on a five-point Likert scale ranging from strongly disagree (score = 1) to strongly agree (score = 5) (see Appendix XI for scoring sheet). As appointment observation focused on the evaluation of handling practices as well as the provision of resources, such as treats and items to increase surface traction, management-based and resource-based measures of animal welfare were employed. As for the interview, these aspects were selected on the basis of previous results (Dawson et al 2016) and other published literature regarding patient handling in the veterinary setting (i.e. Anseeuw et al 2006, Hammerle et al 2015, Herron et al 2014, Rodan 2010, Rodan et al 2011). If technicians participated in the appointment, their interaction with the patient was scored separately from the veterinarian-patient interaction. Thus, in some instances, two scores were produced for any one aspect of handling within a single appointment. Up to six appointments per veterinary clinic (ideally three canine and three feline) were selected randomly for analysis. In instances when less than three feline appointments were video recorded, whenever possible canine appointments were analyzed in their place, such that six total could be evaluated.
Three observers scored each appointment: one was an experienced observer (observer 1, LD) and two were inexperienced observers different from those used to score interview responses (observers 4 and 5). Observer 1 was a doctoral student in animal welfare and observers 4 and 5 were upper-year undergraduate Bachelor of Science students with an interest in animal welfare. Inexperienced observers completed a training session carried out by the experienced observer prior to scoring; during this session, scoring sheets and criteria were reviewed, a sample of appointments were analyzed, and scoring was compared. Following this session, all appointments were scored independently, without communication between observers. To assess intra-observer reliability, a subset of 50 appointments were analyzed a second time by the experienced observer; this was done a minimum of 20 weeks after completion of the initial round of scoring. To select these appointments, veterinary clinics were chosen at random, and all appointments initially scored from that clinic were re-evaluated, until a total of 50 appointments total had been assessed; appointments from 11 randomly selected clinics were used for this purpose. Videos were evaluated in a random order.

To account for the context in which various handling techniques were employed, one observer (observer 1) categorized canine and feline patients based on their behaviour during veterinary appointments. Patient behaviour was scored from video recordings according to an ethogram that outlined canine and feline behavioural signs of fear and aggression (see Table 5.2). A patient was categorized as ‘fearful’ if the dog or cat displayed three or more signs of fear. A patient was categorized as ‘aggressive’ if the dog or cat displayed two or more signs of aggression. In all other situations, the patient was categorized as ‘neutral’. Patient behaviour was noted from entry into the examination room to the end of the physical examination conducted by
the veterinarian, as this is the time frame during which modifications to approach or handling would be effective in mitigating patient fear.

Treatment area observation

When permitted by veterinary clinic staff, up to two video cameras (Sony Handycam HDR-CX22), mounted on small, flexible tripods (Joby GorillaPod SLR-Zoom) were also unobtrusively installed in the treatment area. Cameras were positioned so as to capture as much of the treatment area as possible, with a particular focus on the treatment table(s). These cameras were turned on immediately following installation, and were left to record all activities in the treatment area for the full duration of the visit.

Statistical analysis

Raw percent agreement between the inexperienced observers and the experienced observer was calculated at the overall interview and appointment level, as well as for each individual item within each data type. To evaluate scoring reliability, weighted kappa statistics using quadratic weighting and exact Monte Carlo estimates, including 95% confidence intervals, were computed using SAS statistical software (version 9.4, SAS Institute, Cary, NC, USA). Weighted kappa statistics were chosen to account for the degree of disagreement in scores (Viera & Garrett 2005), whereby disagreements that are closer together on the scoring scale (e.g. 1 vs. 2) were given partial credit for less disagreement that those that are further apart (e.g. 1 vs. 3). Inter-observer reliability was assessed via pair-wise comparisons of the experienced observer’s scores to those from the two inexperienced observers. Intra-observer reliability was determined by comparing the experienced observer’s scores from two separate scoring sessions. Overall weighted kappa statistics were calculated at the interview and appointment observation levels.
independently, such that an overall statistic was calculated for each data type without regards to individual aspects of behavioural health or handling. Inter- and intra-observer reliability via weighted statistics were also calculated at the individual question level for interview responses and the handling item level for appointment observation scores. Weighted kappa statistics were interpreted according to guidelines set by Landis and Koch (1977); a weighted kappa ($K_w$) falling between 0.81 and 1.00 suggests almost perfect agreement, 0.61 to 0.80 suggests substantial agreement, and 0.41 to 0.60 suggests moderate agreement.

For interview data, analysis was performed on scores on the two-point or three-point scales as described above. For appointment observation data, analysis was performed on scores on a five-point scale. In the event that both a veterinarian and veterinary technician handled a patient, such that there were two scores for any one handling aspect during any single appointment, the lower of the two scores was used for analysis; this was done to account for the ‘worst’ handling experience the patient might have had during their veterinary appointment. Descriptive statistics (i.e. frequency distribution of scores) and measures of central tendency (i.e. median, range) were also calculated for each handling item for both interview responses and staff-patient interaction observed through video recordings of appointments. Simple descriptive statistics were also computed for patient behaviour, including the frequency with which different handling techniques were used relative to the patient’s behaviour.

**Results**

**Participants**

Of the 474 veterinary clinics invited to the study, 9% (41) agreed to participate, 22% (105) declined to be involved, and 44% (209) did not provide a response to the invitation either
way. Moreover, as the follow-up process was halted once 30 veterinary clinic visits had been scheduled, 25% (119) of invited clinics were never individually contacted. Participation rates were approximately 6% (24/417) for invited companion animal practices and 11% (6/57) for invited mixed animal practices. Practices treating only companion animals accounted for 80% of all participants, whereas those treating companion animals as well as any other animal species accounted for 20%. All clinics treated dogs and cats, with the exception of a single feline-only practice. Five clinics were certified by the American Animal Hospital Association and five were participants in the AAFP Cat Friendly Practice® program.

Scoring reliability: interview

Values for raw percentage agreement are outlined in Table 5.3. In short, accounting for all questions asked during the interview, raw percentage agreement was 79% and 80% for the inexperienced, trained observers versus the experienced observer (see Table 5.3). Intra-observer percent agreement was higher, with the experienced observer showing 94% agreement for the two scoring sessions.

For interview scoring as a whole, weighted kappa statistics were 0.82 and 0.81 for inter-observer reliability, and 0.95 for intra-observer reliability (Table 5.3); with weighted kappas above 0.80, both showed almost perfect agreement. At the individual topic level, weighted kappa statistics ranged from 0.35 to 1.00 for agreement between observers. Interestingly, inter-observer reliability scores for allowing feline patients time to exit their carrier on their own had weighted kappas at both ends of this range; it was lowest ($K_w = 0.35$) for one pair of observers and highest ($K_w = 1.00$) for the other pair. Nonetheless, neither inexperienced observer showed consistently greater agreement with the experienced observer across all topics; in other words, both observers
had some areas of disagreement. Although no aspect of behavioural health showed almost
perfect agreement across both pair-wise comparisons, eight aspects showed at least substantial
agreement, with inter-observer weighted kappa statistics consistently greater than 0.60. At the
topic level, intra-observer reliability was more consistent, and had a smaller range (Kw = 0.79 –
1.00), than inter-observer reliability. For all topics except taking the top off the carrier and using
scruffing when handling feline patients, the experienced observer showed almost perfect
agreement (Kw > 0.80). Notably, recognizing fear in cats, approaches used to minimize patient
fear, and providing cats with time to exit their carrier on their own showed perfect agreement
(Kw = 1.00) over two scoring sessions by the experienced observer.

Scoring reliability: appointment observation

As a whole, between observer percent agreement from videos for patient handling in
appointments was considerably lower than for responses to interview questions. Inexperienced,
trained observers showed 50% and 46% agreement with the experienced observer (Table 5.4).
Moreover, although intra-observer percent agreement was higher, it still only reached 66%. Raw
percent agreement values for each individual handling aspect are outlined in Table 5.4.

Similarly, overall weighted kappa statistics were lower for appointments than for
interviews (Table 5.4). Between observer scoring reached substantial agreement (Kw = 0.74 and
0.70), whereas within observer scoring was more consistent, reaching almost perfect agreement
(Kw = 0.84). When considering aspects of handling independently, weighted kappa statistics for
inter- and intra-observer reliability showed similar distributions, ranging from -0.02 to 0.80 and -
0.03 to 0.79, respectively. Scores for the use of sedation were the least reliable both between and
within observers, although they showed high raw percent agreement. Unlike for interviews,
however, only two aspects of staff-patient interaction (i.e. the use of rewards and positive reinforcement, and increasing surface traction during physical examination) were able to reach at least substantial agreement between observers (Kₜ > 0.60). Likewise, no aspect of staff-patient interaction reached almost perfect within-observer agreement (Kₜ > 0.80), and only four aspects were able to surpass the threshold for substantial agreement.

**Descriptive statistics: interview**

Interviews were completed with a representative from each participating clinic (100% completion rate). Practice owners completed 22 interviews and other senior veterinarians completed 8 interviews. As shown in Figure 5.1, the vast majority of veterinarians received excellent scores for confidence in their ability to offer behaviour advice and/or having a relationship with a behaviourist or trainer (83%), using appropriate approaches to minimize patient fear (77%), and recommending appropriate and discouraging inappropriate training methods for puppies and kittens (73%); these were the areas with the greatest proportion of participating clinics receiving excellent scores, and the median score of all three items was 3 (see Table 5.5). At the other extreme, three areas with a relatively high proportion of veterinarians using insufficient approaches were the recognition of aggression in both dogs and cats (50% for both, median score = 1), and the provision of information to prevent behaviour problems in puppies and kittens (40%). On the positive side, even in these three weaker areas, some of the veterinary clinics did receive acceptable or even excellent scores for their practices. In fact, for most aspects of behavioural health, veterinary clinics scored across the full range of possibilities, with some clinics receiving insufficient, acceptable and excellent scores on different aspects of the interview (Figure 5.1, Table 5.5). The two exceptions were the use of treats and positive
reinforcement, and confidence to provide behavioural advice and/or a relationship with a behaviourist or trainer, for which no clinics were rated as insufficient. For the handling of feline patients specifically, interview responses indicate that the majority of veterinarians usually allow cats time to exit their carrier on their own (93%) and rarely assist exit from the carrier (e.g. pulling the cat out) (62%), routinely remove the top from the carrier when the design allows (77%), and use towel wraps (79%) (Figure 5.2). Approximately half of clinics regularly use scruffing as a handling technique, whereas the other half only do so in limited situations. Nonetheless, no single feline handling technique was routinely or rarely used by every participating veterinary clinic. In other words, there was variation in feline handling techniques across this sample of veterinarians.

Descriptive statistics: appointment observation

At each veterinary clinic visit, between two and 14 veterinary appointments were video recorded. We were able to fulfill our initial goal of capturing six appointments at 17 clinics, and of including at least three feline appointments at 10 clinics. In one clinic, no feline appointments could be captured, and in three clinics, no wellness appointments could be captured. Even though a single day visit was sufficient to capture some type of appointment in most clinics, it was necessary to visit two veterinary clinics on two occasions to capture any appointments; despite two visits, only two appointments could be captured at each of these clinics.

A total of 152 of the captured appointments were analyzed (range: two – six appointments/clinic, median: six appointments/clinic). More of these appointments were with canine patients (90 appointments or 59% of all analyzed appointments) than with feline patients (62 appointments or 41%), and most appointments were classified as wellness appointments
(83/152 or 55%), since they were with an apparently healthy animal for the purposes of preventive veterinary health care (e.g. vaccines, preventive parasitic control). Problem appointments, defined as those with diagnosis or treatment as the main goal, accounted for 35% of all analyzed appointments. Recheck appointments, such as those for the purpose of removing sutures after surgery or monitoring response to treatment, accounted for 10% of all analyzed appointments. At least one veterinarian was present in every appointment, and one or more technicians were present in 40% of analyzed appointments. Overall, 76% of cats and 47% of dogs were fearful, and 5% of cats were aggressive; all other patients were categorized as neutral.

A number of handling approaches were employed at a high frequency (> 80% of appointments) in at least one veterinary clinic (Table 5.6). Examples included allowing the patient time to acclimate prior to interaction, examining the patient where it is most comfortable, and increasing surface traction during physical examinations. However, there was high variation in the frequency of use of these three items across our sample of veterinary clinics. On the other hand, three items showed both a low frequency of occurrence in appointments within each clinic and low variation in their frequency of use between veterinary clinics. Clinics never or rarely used sedatives or anxiolytics (30 clinics) and never or rarely used diverse handling techniques (26 clinics). Furthermore, the patient’s expected response to handling was asked about in a very low proportion of recorded appointments (0-20%) for almost all veterinary clinics (28 clinics).

The percentage of specific handling techniques that were observed during veterinary appointments, relative to patient behaviour, are outlined in Table 5.7 (dogs) and Table 5.8 (cats). During the appointment, cats were largely examined on an examination table, whereas attempts, either successful or otherwise, were made to examine dogs elsewhere in roughly half of all canine appointments. Fearful dogs and cats were examined off the table in comparable
proportions to those who did not display signs of fear. Techniques that help to protect human safety (i.e. putting an Elizabethan collar, muzzle or mask on the patient; using gloves) or using objects that facilitate handling and examination through distraction (i.e. providing a toy), were used at low frequencies overall. These techniques were used exclusively with fearful cats, whereas their use with dogs did not appear to be influenced by behaviour. For feline patients specifically, towel or blanket wraps were used in approximately one fifth of the analyzed appointments, but scruffing rarely occurred, and patient behaviour did not appear to influence the use of either technique. Even though cats were often provided with some time to exit the carrier on their own, in roughly three quarters of all feline appointments a staff member had to assist with exit, either by tipping the carrier to encourage the cat to exit, or by lifting, pulling and/or scruffing the cat to forcibly remove it.

Treatment area observation

Veterinary clinic staff permitted video recording in the treatment area in 18 of the 30 (60%) veterinary clinics that were visited. A total of 48 patient treatments were captured, including blood draws, nail trims, expression of anal glands, administration of oral medications, and pre-surgical assessments. Between one and seven treatments were captured at each of the 18 clinics (median: 2.5 treatments/clinic). Of the appointments analyzed above, 12 patients were taken to the treatment area, seven of which were videorecorded. Due to the relatively low number of treatments captured per clinic, and the restricted number of clinics for which videos were available, these videos were not formally analyzed in this study.
Discussion

An assessment tool for behavioural health, incorporating interviews and appointment observations, was evaluated for reliability, validity and feasibility in thirty veterinary clinics. Scoring reliability showed almost perfect agreement ($K_w > 0.80$) for interviews as a whole, both between and within observers, and for appointment observation overall within observers. Inter-observer reliability was lower for appointment observation, with a large range in weighted kappa statistics when the reliability of scoring individual handling aspects were considered independently. Information concerning behavioural health practices was also collected, for the purposes of benchmarking and assessing variability in practices between veterinary clinics. Across this sample of veterinary clinics, strengths included confidence of the veterinarian to offer behaviour advice and/or a working relationship with a behaviourist or trainer, and the use of a calm, non-threatening approach with patients. Areas with opportunity for enhancement included the recognition of aggression in canine and feline patients and the use of diverse handling techniques, whereby the techniques used are adapted to the patient and its needs.

Reliability refers to the extent to which a measurement is both repeatable and consistent (Martin & Bateson 1993). When assessing the same item, observers should agree with each other (inter-observer reliability) and a single observer should agree with his or her self over multiple occasions (intra-observer reliability), such that similar conclusions can be drawn across individuals and occasions. As a whole, reliability was higher for interviews than for appointment observations. Reliability was also higher for intra-observer comparisons than inter-observer comparisons, showing almost perfect agreement ($K_w > 0.80$) between observers for interviews, substantial agreement ($K_w > 0.60$) between observers for appointment observation, and almost perfect agreement ($K_w > 0.80$) within observer for both interviews and appointment observation.
The inexperienced observers used for interview scoring were different from those used for appointment observation, and it is possible that this might partially account for differences in the inter-observer reliability of the different assessment methods. However, at the individual item level, reliability showed a large range across both assessment types. Reliability is particularly important for welfare assessment schemes, as an unreliable measure risks unfairly penalizing or rewarding program participants; the outcome of the assessment should not depend on the observer who performed the assessment.

Rules outlining acceptable reliability levels do not exist, so any cut-offs for the inclusion of items in a welfare assessment tool would be arbitrary (Meagher 2009). Nonetheless, some statisticians (Fleiss et al 2003) have suggested a weighted kappa of 0.40 as a minimum acceptable level of inter-observer reliability. If cut-offs for inclusion were arbitrarily set at a weighted kappa of 0.40 for inter-observer reliability for at least one pair of observers, all items from the interviews would be retained, but 4 of the 9 items from appointment observation would be excluded from the welfare assessment tool. Many items with values close to or below this cut-off for one pair of observers had high intra-observer reliability (e.g. allowing patients time to acclimate prior to interaction). For instance, if cut-offs were based on attaining almost perfect agreement for intra-observer reliability (Kw > 0.80), all items from the interview except one (cat handling: remove top from carrier) would remain in the assessment scheme. This suggests that it is possible to attain high levels of agreement, and that perhaps with more elaborate training or a more detailed scoring scheme, inter-observer reliability could be improved for all pairs of observers and a more ambitious cut-point could be employed. Moreover, reliability is affected by observer experience, and drift can occur over time as observers’ personal definitions might unconsciously influence their scoring (Martin & Bateson 1993). Although it would theoretically
be possible to formally evaluate drift in scoring by investigating weighted kappa statistics at different time points (i.e. early vs. late), it is not possible to statistically compare any differences due to the inherent covariance involved with having the same observer pairs. Regular training meetings to thoroughly review the scoring scheme, recalibrate observers, and evaluate reliability can reduce drift, and have been successful in maintaining high inter-observer reliability in other animal welfare studies (e.g. Gibbons et al 2012). Nonetheless, although observers were only trained once prior to beginning scoring, their training sessions were extensive, so any drift should be minimal.

The current results highlight a number of areas for which most veterinarians are doing an excellent job. A large proportion of participating veterinarians were both confident enough to offer behaviour advice, and also reported an established relationship with an external behaviour professional, so there is potential for many owners to receive behavioural aid should their pets have behaviour problems. Many veterinarians also appear to encourage appropriate training methods, by recommending the use of welfare-friendly methods such as positive reinforcement (i.e. the application of a stimulus to increase a desirable behaviour, Hiby et al 2004). Many veterinarians also appear to discourage the use of aversive methods such as positive punishment (i.e. the application of a stimulus to decrease an undesirable behaviour, Hiby et al 2004), or other methods likely to lead to physical or mental harm. Within the clinic itself, the majority of veterinary clinics report using multiple positive approaches to mitigate patient fear, suggesting that staff members are aware of how to appropriately minimize patient fear; examples include moving at the animal’s pace, kneeling or avoiding eye contact to appear less threatening, and offering treats. Observation of appointments revealed that many veterinarians use these calm,
non-threatening approaches at a high frequency in their appointments, and that many frequently perform physical examinations where their canine patients seem to be most comfortable.

The current results also identify areas with opportunity for enhancement. Interview responses suggest that a substantial number of veterinarians might have difficultly recognizing some key signs of a potentially aggressive patient; many rely on less than two behavioural signs, and do not include any obvious signs, such as vocalization, swatting or lunging. Over the span of their career, 75% and 80% of veterinarians report previously having been bitten by a dog or cat (Drobatz & Smith 2003). In one study involving questionnaires, animal caregivers, including veterinarians, nurses and trainees, were 3.9 times more likely to be bitten when interacting with difficult to handle animals compared to those animals that were not difficult to handle (Drobatz & Smith 2003). Early intervention is integral to the protection of both human and animal safety, and depends on the early recognition of a potentially aggressive patient, such that appropriate approaches can be used to mitigate the situation before it escalates. Interview results also suggest that many veterinarians provide little information, if any, to owners to prevent common behaviour problems in puppies and kittens. Prevention of behavior problems is often more effective and easier than treatment, and puppy and kitten visits provide an ideal platform for client education about animal behaviour and appropriate behavior training (Overall 1997). Dogs whose owners received preventive behaviour advice during their first veterinary visits were less likely to have developed behaviour problems, such as stranger-directed aggression, at one year of age (Gazzano et al 2008). A similar effect was seen in cats: when owners received behaviour advice during initial kitten appointments, their cats were more likely to tolerate handling during veterinary visits and less likely to have developed problem behaviours, such as curtain climbing and excessive vocalization, by their first annual vaccination appointment (Gazzano et al 2015).
As such, when veterinarians do not provide this key information to owners of young patients, they are missing the opportunity to prevent many behaviour problems.

Although interview responses suggested that many veterinarians were aware of at least some methods for reducing patient fear and stress during handling, based on appointment observations, low-stress handling techniques were actually used at a low frequency overall and did not appear to be influenced by patient behaviour. Diverse handling techniques allow veterinary staff members to adapt to individual patient needs, and can help to reduce patient stress and fear, while also facilitating examination. As such, the American Animal Hospital Association and American Association of Feline Practitioners recommend that veterinarians use a variety of handling techniques (Hammerle et al 2015, Rodan et al 2011). Techniques to protect human safety (e.g. muzzle) or distract patients (e.g. toys) were only used in a handful of patients. Stress-reducing handling techniques, like the use of pheromones and towel wraps to aid with restricting movement without requiring additional personnel or heavy physical restraint, were also used relatively infrequently. Other simple techniques, like asking about animal response to handling to avoid unnecessary arousal or adverse reactions, or increasing the surface traction with a simple bathmat, rubber backed carpet, or exercise mat, are fast, inexpensive and easy methods to improve the patient’s experience. These were not used to a high degree in this sample of veterinary clinics. Overall, these techniques were used at a low frequency despite the fact that 76% of cats and 47% of dogs were fearful; in other words, it would have been appropriate for veterinary staff members to modify their approach and handling techniques to mitigate patient fear in many of the observed appointments. Alternatively, veterinary staff might not have recognized fear, stress, or potential aggression in their patients. An alternative method to evaluate veterinarians’ abilities to recognize and manage fearful and aggressive patients could be
to show videos of dogs and cats in a clinical setting, then ask veterinarians to evaluate patient
behaviour and describe how they would handle or approach the patient. Some veterinarians could
also be unaware of the benefits of employing different handling techniques. Some veterinary
schools might not provide sufficient opportunities for students to learn diverse, low-stress patient
handling techniques in pets, and when it is taught, safety rather than improved patient experience
might be the emphasis. (e.g. Stafford and Erceg 2007). Education through continuing education
opportunities might help to mitigate this deficiency for staff members already working in
veterinary practice. Although low-stress handling has recently garnered increased attention (e.g.
Sophia Yin books, videos and courses; the developing Fear Free℠ certification program), it
might take time for general practitioners to learn about these methods and additional time for
them to incorporate them into their standard practice routine.

Measuring aspects of behavioural health management through both interviews and videos
allows comparisons to be made between the two methods of data collection. For feline handling
specifically, appointment observation revealed that fewer cats were provided with time to exit
their carriers independently than was reported in interviews (64% in appointments vs. 93% in
interviews). Cats in the appointment room were assisted to exit the carrier in higher frequencies
than would be expected based on interview responses (74% of cats were assisted in appointments
vs. 38% veterinarians routinely assist according to interviews). Grabbing the cat and/or tipping
and shaking the carrier are thought to negatively affect the cat, and are not recommended (Rodan
et al 2011), but these methods were used in 63% of the visited clinics based on appointment
observation. Carriers with removable tops permit examination of the cat in the bottom of the
carrier, which can be a less stressful experience and particularly useful for fearful cats (Anseeuw
et al 2006, Ellis et al 2013, Rodan et al 2011). Carrier tops were removed in far fewer
appointments than expected based on interview responses (12.5% observation vs. 77% interviews). This mismatch might be explained by the design of the carrier that the owner used; it is possible that, in many cases, veterinarians could not use this technique if carrier design did not permit the top to be removed. Furthermore, removing the carrier top is not necessary when cats exit the carrier on their own. Towel wraps were also used less frequently than expected (18% of appointments vs. 79% veterinarians reporting that they routinely use this technique). The use of a towel to swaddle or wrap around feline patients is thought to provide a sense of security, and is recommended whenever a patient is fearful or aggressive (Rodan et al 2011). It is possible that towels might be used at high frequencies in the treatment area, where difficult patients are likely to be managed and procedures requiring restraint are more likely to occur; it was not possible to evaluate this in the current study. Finally, despite interview results indicating that 47% of veterinarians routinely scruff cats (i.e. pinching the back of the cat’s neck to induce behavioural inhibition, Rodan et al 2011), only four patients at four different veterinary clinics were scruffed during appointments. This mismatch is a welcome finding because a growing number of veterinary organizations are opposed to this handling technique (e.g. AAFP, Rodan et al 2011).

In order to effectively categorize and separate veterinary clinics based on their behavioural health practices, there must be variation in the outcome measures included in the tool. If every clinic employed the same practices, each would receive the same score, and the tool would not offer any discriminative ability. Responses from interviews suggest a wide range in practices related to behavioural health; for all except two items (i.e. confidence to offer behaviour advice and/or a relationship with a behaviourist; use of positive reinforcement), clinic scores ranged from insufficient (1) to excellent (3). A range in practices were also observed through appointment observation, with most items scoring across the full range of possibilities.
(i.e. 1 to 5) at the appointment level, and across at least two quintiles for frequency of use at the clinic level. For tool development, ceiling effects are more detrimental than floor effects. Even though the ability to separate clinics is reduced in both cases, if the majority of scores are towards the lower end of the range, the tool would at least permit improvement and progress.

Validity is another key component to consider when determining which measures to include in an animal welfare assessment tool. Validity refers to the extent to which measures assess what they intend to, in an accurate, specific, and scientifically valid manner (Martin & Bateson 1993). Items included in this assessment tool were based on results from a multi-stage consultation with animal welfare experts and veterinarians, and the scoring scheme was developed in accordance with published research regarding best practices for behavioural management. Despite this, the content of interview responses should be validated against observed staff-animal interactions, in order to assess the ability of interviews to accurately represent true behavioural health practices. Responses from verbal interviews can be biased by the interviewees’ desire to appear favourably, or to provide the response they believe the researcher is seeking (Tourangeau & Yan 2007). This social desirability bias could have affected the responses veterinarians provided, particularly if they believed their approaches were not in line with the rest of the veterinary community, thus decreasing the accuracy of interviews as a means of assessment. Social desirability might be expected to also impact patient handling within appointments, yet many recommended handling techniques were infrequently used, suggesting that veterinarians were likely acting according to their usual practice rather than a desire to impress the research team. Video evidence of staff-animal interaction was used in this study as a means to validate the accuracy of interview responses. Discrepancies between interview responses and actual animal interactions suggest that interviews might not accurately
represent behavioural health practices for all veterinarians in the clinic. There could be variation in approaches amongst veterinarians within the same clinic, so discrepancies might be explained by the fact that interviews were not always completed with the veterinarians who were observed during appointments. The majority of veterinarians who completed interviews were clinic owners, whereas appointments were generally completed by more recent graduates. Moreover, observer assessments of the frequency of use of different handling methods were based on long-text interview responses. If veterinarians had been asked about the percentage of appointments in which they employ any given technique, the discrepancy might be reduced; however, the use of closed-ended questions might also be less likely to produce responses that reflect reality, compared to open-ended questions. It is also possible that veterinarians know how to manage fearful or aggressive patients, but might not reliably recognize these patients and so do not modify their handling approaches appropriately. Although challenging to capture in practice, if future assessments could capture appointments with patients showing a range in behaviours (e.g. calm, fearful, aggressive), it would be possible to standardize the assessment and examine veterinarian responses to a variety of situations. Compared to on-farm welfare assessments, the behaviour of animals in the clinic environment can be heavily influenced by previous experiences that are unrelated to the clinic under assessment and there can be much greater variability in these previous experiences. Without standardization, handling techniques used on any given day might more accurately reflect the temperaments of the individual animals rather than the abilities of the veterinary staff. Moreover, appointments with patients that vary in age (i.e. puppies, kittens) would also be necessary to properly validate the provision of information to prevent behaviour problems in young animals, and the type of training methods veterinarians recommend and discourage.
Although not formally assessed here, staff-patient interaction in the treatment area might also differ from that in appointments, possibly in a manner more consistent with that discussed in interviews. Animals might be handled differently in the treatment area compared to during an appointment in front of the client; the type of procedures performed in the treatment area might necessitate different handing techniques, and the type of patients taken to the treatment area might be more difficult to handle than those who remain in the examination room. Nonetheless, if the goal of the assessment tool is to evaluate the animal’s experience in the veterinary clinic, it should include all aspects of handling, including interactions when the owner is absent. Unfortunately this was not possible in the current study as not all clinics were amenable to assessment in the treatment area, and participation was voluntary as required by regulations that govern research involving human participants.

The use of questionnaires as a format for assessment could also be explored in future research. Questionnaires are less prone to social desirability bias than interviews, but would require the use of closed-ended questions in which the optimal answer would have to be provided as an option. Thus questionnaires might consequently also have issues with validity.

Feasibility encompasses practicality, ease of use and cost effectiveness. Even though a highly reliable and valid tool is desirable, it would not be of use if it were not practical to implement in terms of time, effort and expense. Since verbal interviews can be conducted at a distance by telephone, they do not necessitate travel, thus requiring less time and cost than appointment observation, at least under the current model. It could be possible to improve the feasibility of appointment observation if recording equipment were installed and left in veterinary clinics, allowing data to be collected without the presence of a researcher. Under the current single-day visit model, less than six appointments and three feline appointments were
captured in 13 and 20 participating veterinary clinics. Providing veterinary clinics with recording equipment could improve these statistics, and with this, more variation in appointments and treatments could be captured. Conversely, it could introduce bias if veterinarians were to selectively video record certain appointments and procedures in the treatment area; validity would thus be sacrificed for improved feasibility. It would also require additional effort on the part of veterinary clinic staff, as each recorded individual must be briefed about the study and provide consent prior to inclusion, and this must be done in a manner in which clients do not feel coerced to participate. This highlights a key difference between animal welfare assessments conducted in agricultural versus veterinary clinic environments: welfare assessments incorporating video recording of human-animal interaction in veterinary clinics require the consent of both pet owners and staff members, whereas welfare assessments for agricultural species only require approval from staff members, and there would only be a single owner for all animals on any given farm. Moreover, recordings in the treatment areas were only captured in 18 veterinary clinics (60%), and too few were captured to permit analysis for this project; a number of clinics simply did not have any treatments planned the day of the visit, and a number of veterinarians and veterinary staff members were not amenable to observations in the treatment area. With an established, formal animal welfare assurance program, this important aspect of the patient’s experience could be included.

The number of veterinary clinics included in this study might limit the generalizability of results, particularly the descriptive results. Participating veterinary clinics were within a certain geographic distribution, so if regional differences in behavioural health practices exist, our sample might not be representative of all veterinary clinics in Ontario or Canada. On the other hand, the sample included both companion and mixed animal practices over a range of rural,
suburban and urban communities, such that there was considerable variability in the characteristics of study participants. Moreover, although those inherently more interested in a topic are typically more likely to participate in related research, only a limited number of participating veterinary clinics belonged to voluntary accreditation programs related to improved animal welfare and higher quality of care (i.e. AAHA Accredited®, Cat Friendly Practice®), and these enrollment levels were no different from national enrollment levels. For example, 17% of participating clinics were AAHA Accredited®, and this is consistent with national enrollment, which is estimated to be between 12 and 15% of all Canadian and American veterinary clinics (American Animal Hospital Association 2015). Additionally, in some veterinary clinics, only a limited number of appointments could be captured. Handling approaches in appointments were considered to be representative of typical practices, but it might be unfair to consider staff-patient interaction in as few as two appointments to be representative of what occurs in all appointments. The evaluation of the reliability and feasibility of the welfare assessment tool, however, did not depend on the content of the data, thus the primary goal of this study to evaluate the tool was not compromised.

Future research should evaluate a third aspect of reliability not tested here: test-retest reliability. In short, it is important that an assessment tool leads to similar conclusions across multiple visits, assuming that all welfare practices have remained the same. This could be evaluated by carrying out interviews and video recording appointments at least one additional time per clinic, during a second visit. It would also be useful to scientifically validate that certain handling methods have a considerable and measurable effect on patient welfare. For example, even though it is generally thought that allowing feline patients time to exit their carriers on their own leads to more relaxed and cooperative patients, this effect has not been proven objectively.
It would also be interesting to evaluate whether the use of various positive handling methods have an additive effect.

In summary, neither interview nor appointment observation maximized reliability, validity and feasibility. Results of this study suggest that interviews are more reliable in terms of scoring, both between and within observers, and are simpler and easier to implement than appointment observation. Conversely, discrepancies between interview responses and data from appointments suggest that interviews might be a less valid measure of staff-patient interaction. This conclusion requires confirmation from treatment area observation and patient behaviour data. Furthermore, more elaborate training for inexperienced observers could improve the reliability of appointment observation scoring. Results also suggest that there is considerable variation across veterinary clinics in practices related to behavioural health. Participating veterinary clinics scored highly for a number of items, such as the use of non-threatening approaches to patients. On the other hand, low scores for other aspects (e.g. recognition of aggression in patients) suggest that there is still opportunity for enhancement. Overall, a mix of interview and appointment observation might be the best approach to assessing behavioural health in a veterinary clinic setting.
References


Rodan, I. 2010. Understanding feline behavior and application for appropriate handling and management. Topics in Companion Animal Medicine, 25(4), 178-188.


Stafford, K.J., Erceg, V. 2007. Teaching animal handling to veterinary students at Massey University, New Zealand. Journal of Veterinary Medical Education, 34(5),


Table 5.1: Simplified scoring scheme for veterinarians’ interview responses to interview questions regarding behavioural health

<table>
<thead>
<tr>
<th>Aspect of behavioural health</th>
<th>Excellent (3)</th>
<th>Acceptable (2)</th>
<th>Insufficient (1)</th>
<th>Adjustment (±0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approaches to examine an aggressive patient</td>
<td>Protect human safety AND lead to long-term resolution¹</td>
<td>Protect human safety</td>
<td>Physical force</td>
<td>-</td>
</tr>
<tr>
<td>Approaches to minimize patient fear</td>
<td>2+ positive approaches²</td>
<td>1 positive approach</td>
<td>No positive approaches³</td>
<td>- 0.5: inappropriate in conjunction with positive approaches + 0.5: preventive measures ± 0.5 appropriate criteria for trainer</td>
</tr>
<tr>
<td>Confidence to offer behaviour advice and/or relationship with behaviourist or trainer</td>
<td>Confident AND have relationship</td>
<td>Not confident, have relationship OR confident, no relationship</td>
<td>Not confident, no relationship</td>
<td></td>
</tr>
<tr>
<td>Information to prevent behaviour problems in puppies and kittens</td>
<td>3+ behaviour problems - must include socialization (kittens, puppies) and housetraining (puppies)</td>
<td>2+ behaviour problems OR do not provide any information</td>
<td>1 behaviour problem OR do not provide any information</td>
<td>- 0.5 none for kittens + 0.5 handouts and discussion - 0.5 only in handout form</td>
</tr>
<tr>
<td>Recognition of aggression in cats, dogs</td>
<td>3+ signs of aggression - at least one obvious sign⁴ - at least one subtle sign⁵</td>
<td>2 signs of aggression - at least one obvious sign⁴ - no obvious signs⁴</td>
<td>&lt; 2 signs of aggression - no obvious signs⁴</td>
<td></td>
</tr>
<tr>
<td>Recognition of fear in cats, dogs</td>
<td>3+ signs of fear - at least one obvious sign⁶ - at least one subtle sign⁷⁷</td>
<td>2 signs of fear, - at least one obvious sign⁶ - no obvious signs⁶</td>
<td>&lt; 2 signs of fear - no obvious signs⁶</td>
<td></td>
</tr>
<tr>
<td>Recommend and discourage training methods for puppies and kittens</td>
<td>Recommend appropriate (positive) AND discourage inappropriate (negative)</td>
<td>Recommend appropriate (positive) OR discourage inappropriate (negative)</td>
<td>Only inappropriate (negative) methods</td>
<td>- 0.5 recommend any inappropriate training methods</td>
</tr>
<tr>
<td>Use of treats and positive reinforcement</td>
<td>Always: dogs and cats, whenever medically appropriate</td>
<td>Sometimes: only for dogs, not every occasion</td>
<td>Rarely or never</td>
<td></td>
</tr>
</tbody>
</table>

¹ Approaches that lead to long-term resolution of aggression include encouraging regular visits to develop a positive association to the clinic, and recommending that clients seek advice and training from a behaviourist or trainer.
² Positive approaches include approaches such as offering treats, allowing time to acclimate, using non-threatening behaviour (e.g. kneeling)
³ Inappropriate approaches include: using heavy restraint to quickly complete exam, using muzzles or other restraint devices, using chemical restraint
⁴ Obvious signs of aggression include: vocalization, swatting, snapping, lunging, any obvious signs of fear if acknowledge that aggression is fear-based
Subtle signs of aggression include: tense facial expression, tense body, piloerection, direct eye contact (dogs), any subtle signs of fear if acknowledge aggression is fear-based

Obvious signs of fear include: body/ear/head/tail position, hiding, avoiding physical contact, aggression, vocalization, urination/defecation

Subtle signs of fear include: avoid eye contact, back away, freeze, tremble, pupil dilation, facial expression, not taking treats, lip licking, panting (dogs), yawning (dogs)
### Table 5.2: Ethogram for the assessment of fear and aggression based on canine and feline behaviour during veterinary appointments

#### A) Behavioural signs of fear

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowered or crouched body position</td>
<td>Vertical body position, as related to the proximity to the ground, including lowering of front and/or back end</td>
</tr>
<tr>
<td>Sideways, backwards, flattened ear</td>
<td>Ear rotation, accounting for breed specific conformation when applicable</td>
</tr>
<tr>
<td>position</td>
<td></td>
</tr>
<tr>
<td>Lowered or flattened head position</td>
<td>Height at which head is held, relative to a neutral stance</td>
</tr>
<tr>
<td>Lowered or tucked tail position</td>
<td>Height at which the tail is held, relative to a neutral stance. A tucked tail refers to the tail being held between the legs.</td>
</tr>
<tr>
<td>Slow movement</td>
<td>Tentative movement at low speed</td>
</tr>
<tr>
<td>Maintenance of distance</td>
<td>Any behaviour that increases or maintains distance from veterinary staff member, including movement away after attempts to touch/pet animal, backing or staying away</td>
</tr>
<tr>
<td>Hiding</td>
<td>Any behaviour that involves using objects to buffer interaction with veterinary staff members. Includes resting under or behind chairs or tables, and placing head under owner’s arm</td>
</tr>
<tr>
<td>Pacing</td>
<td>Quick, repetitive and deliberate movement over a limited area, with no apparent function</td>
</tr>
<tr>
<td>Freezing</td>
<td>Complete absence of movement</td>
</tr>
<tr>
<td>Body tension or stiffness</td>
<td>Rigid body, movement with limited range of motion</td>
</tr>
<tr>
<td>Trembling</td>
<td>Small body movements without any displacement of the animal. Shaking does not include full body shakes, as would be seen when a dog gets out of water.</td>
</tr>
<tr>
<td>Avoidance of eye contact</td>
<td>Eyes averted away from the veterinary staff member</td>
</tr>
<tr>
<td>Hyper vigilance</td>
<td>Exaggerated survey of room and surroundings, including quick head movement and repeatedly looking at locations recently and already seen.</td>
</tr>
<tr>
<td>Pupil dilation</td>
<td>Increased pupil diameter</td>
</tr>
<tr>
<td>Yawning</td>
<td>Opening mouth widely</td>
</tr>
<tr>
<td>Panting</td>
<td>Breathing with short, rapid, shallow breaths</td>
</tr>
<tr>
<td>Lip licking</td>
<td>Tongue movement out of mouth and around nose/mouth, not including licking in anticipation of food</td>
</tr>
<tr>
<td>Urination or defecation</td>
<td>Any incidence of urination or defecation within the clinic, with the exception of that induced by medical procedures</td>
</tr>
</tbody>
</table>

#### B) Behavioural signs of aggression

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hissing or growling</td>
<td>Vocalization producing a high pitched spitting noise or a low, guttural noise</td>
</tr>
<tr>
<td>Lunging</td>
<td>A sudden weight shift forward in direction of veterinary staff or owner</td>
</tr>
<tr>
<td>Swatting</td>
<td>Raising and quickly moving paw in direction of veterinary staff or owner, includes successful and unsuccessful attempts</td>
</tr>
<tr>
<td>Biting or snapping</td>
<td>Opening and quickly closing mouth in direction of veterinary staff or owner, includes successful and unsuccessful attempts</td>
</tr>
</tbody>
</table>
Table 5.3: Interview: inter- and intra-observer reliability of scoring responses given by veterinarians from 30 veterinary clinics to interview questions regarding behavioural health, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Aspect of behavioural health</th>
<th>Observer 1 vs. 2</th>
<th>Observer 1 vs. 3</th>
<th>Observer 1 vs. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
<td>$K_w$ [95% CI]</td>
</tr>
<tr>
<td>Approaches to examine an aggressive patient</td>
<td>0.68 [0.40-0.96]</td>
<td>77</td>
<td>0.64 [0.29-0.99]</td>
</tr>
<tr>
<td>Approaches to minimize patient fear</td>
<td>0.74 [0.47-1.00]</td>
<td>77</td>
<td>0.65 [0.47-0.84]</td>
</tr>
<tr>
<td>Cat handling: allow time to exit carrier on own</td>
<td>1.00 [1.00-1.00]</td>
<td>100</td>
<td>0.35 [-0.22-0.92]</td>
</tr>
<tr>
<td>Cat handling: assist exit from carrier</td>
<td>0.61 [0.29-0.94]</td>
<td>77</td>
<td>0.57 [0.18-0.96]</td>
</tr>
<tr>
<td>Cat handling: remove top from carrier</td>
<td>0.67 [0.34-1.00]</td>
<td>90</td>
<td>0.59 [0.23-0.95]</td>
</tr>
<tr>
<td>Cat handling: use of scruffing</td>
<td>0.37 [0.11-0.64]</td>
<td>70</td>
<td>0.53 [0.23-0.83]</td>
</tr>
<tr>
<td>Cat handling: use of towel wraps</td>
<td>0.67 [0.32-1.00]</td>
<td>80</td>
<td>0.73 [0.41-1.00]</td>
</tr>
<tr>
<td>Confidence to offer behaviour advice and/or relationship with behaviourist or trainer</td>
<td>0.89 [0.78-0.99]</td>
<td>80</td>
<td>0.80 [0.63-0.98]</td>
</tr>
<tr>
<td>Information to prevent behaviour problems in puppies and kittens</td>
<td>0.59 [0.28-0.90]</td>
<td>57</td>
<td>0.65 [0.48-0.82]</td>
</tr>
<tr>
<td>Recognition of aggression in cats</td>
<td>0.71 [0.48-0.94]</td>
<td>79</td>
<td>0.51 [0.16-0.85]</td>
</tr>
<tr>
<td>Recognition of aggression in dogs</td>
<td>0.66 [0.36-0.97]</td>
<td>82</td>
<td>0.79 [0.58-0.99]</td>
</tr>
<tr>
<td>Recognition of fear in cats</td>
<td>0.81 [0.63-0.99]</td>
<td>87</td>
<td>0.69 [0.49-0.89]</td>
</tr>
<tr>
<td>Recognition of fear in dogs</td>
<td>0.47 [0.15-0.78]</td>
<td>72</td>
<td>0.50 [0.30-0.70]</td>
</tr>
<tr>
<td>Recommended and discouraged training methods for puppies and kittens</td>
<td>0.77 [0.56-0.99]</td>
<td>70</td>
<td>0.92 [0.79-1.00]</td>
</tr>
<tr>
<td>Use of treats and positive reinforcement</td>
<td>0.64 [0.33-0.95]</td>
<td>87</td>
<td>0.64 [0.33-0.95]</td>
</tr>
<tr>
<td>All aspects together</td>
<td>0.82 [0.77-0.86]</td>
<td>79</td>
<td>0.81 [0.77-0.85]</td>
</tr>
</tbody>
</table>

Observer 1 = experienced observer; Observers 2 and 3 = trained, inexperienced observers

$K_w$ = weighted kappa

% Agree = raw percent agreement
Table 5.4: Appointment observation: inter- and intra-observer reliability of scoring handling techniques used by veterinary staff from 30 veterinary clinics in 152 appointments, across three observers in pair-wise comparisons

<table>
<thead>
<tr>
<th>Handling aspect</th>
<th>Observer 1 vs. 4</th>
<th></th>
<th>Observer 1 vs. 5</th>
<th></th>
<th>Observer 1 vs. 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
<td>$K_w$ [95% CI]</td>
<td>% Agree</td>
</tr>
<tr>
<td>Allow patient time to acclimate prior to interaction</td>
<td>0.37 [0.23-0.50]</td>
<td>34</td>
<td>0.43 [0.29-0.56]</td>
<td>26</td>
<td>0.79 [0.68-0.90]</td>
<td>53</td>
</tr>
<tr>
<td>Ask about response to handling prior to interaction</td>
<td>0.32 [0.03-0.61]</td>
<td>87</td>
<td>0.11 [-0.08-0.29]</td>
<td>86</td>
<td>0.44 [0.01-0.88]</td>
<td>80</td>
</tr>
<tr>
<td>Examine where patient is most comfortable</td>
<td>0.17 [0.03-0.31]</td>
<td>34</td>
<td>0.31 [0.16-0.47]</td>
<td>30</td>
<td>0.58 [0.35-0.80]</td>
<td>46</td>
</tr>
<tr>
<td>Increase surface traction during physical examination</td>
<td>0.67 [0.54-0.80]</td>
<td>58</td>
<td>0.67 [0.54-0.80]</td>
<td>57</td>
<td>0.74 [0.56-0.93]</td>
<td>53</td>
</tr>
<tr>
<td>Use of calm, non-threatening approach</td>
<td>0.43 [0.24-0.61]</td>
<td>69</td>
<td>0.26 [0.09-0.42]</td>
<td>69</td>
<td>0.71 [0.44-0.97]</td>
<td>53</td>
</tr>
<tr>
<td>Use of diverse handling techniques</td>
<td>0.43 [0.25-0.60]</td>
<td>21</td>
<td>0.36 [0.17-0.55]</td>
<td>3</td>
<td>0.54 [0.22-0.85]</td>
<td>74</td>
</tr>
<tr>
<td>Use of physical restraint</td>
<td>0.19 [0.05-0.32]</td>
<td>10</td>
<td>0.12 [0.02-0.23]</td>
<td>5</td>
<td>0.47 [0.07-0.86]</td>
<td>76</td>
</tr>
<tr>
<td>Use of rewards and positive reinforcement</td>
<td>0.79 [0.70-0.88]</td>
<td>64</td>
<td>0.80 [0.72-0.88]</td>
<td>63</td>
<td>0.77 [0.60-0.93]</td>
<td>63</td>
</tr>
<tr>
<td>Use of sedatives or anxiolytics (only as needed)</td>
<td>-0.02 [-0.03-0.01]</td>
<td>95</td>
<td>0.19 [-0.01-0.39]</td>
<td>94</td>
<td>-0.03 [-0.07-0.01]</td>
<td>94</td>
</tr>
<tr>
<td>All aspects of handling (pooled together)</td>
<td>0.74 [0.71-0.77]</td>
<td>50</td>
<td>0.70 [0.66-0.73]</td>
<td>46</td>
<td>0.84 [0.79-0.88]</td>
<td>66</td>
</tr>
</tbody>
</table>

Reliability is calculated based on the lowest score for all veterinary staff members and 152 appointments (n = 52 appointments for observer 1 vs. 1). Observer 1 = experienced observer; Observers 4 and 5 = trained, inexperienced observers

$K_w$ = weighted kappa

% Agree = raw percent agreement
Table 5.5: Measures of central tendency for the experienced observer’s scores for responses to interviews with veterinarians regarding behavioural health and handling techniques used by veterinary staff in 152 appointments from 30 veterinary clinics

<table>
<thead>
<tr>
<th>Measure type</th>
<th>Aspect of behavioural health</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview†</td>
<td>Approaches to examine an aggressive patient*</td>
<td>2</td>
<td>1.5 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Approaches to minimize patient fear*</td>
<td>3</td>
<td>1 – 3.5</td>
</tr>
<tr>
<td>Interview†</td>
<td>Cat handling: allow time to exit carrier on own*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Interview†</td>
<td>Cat handling: assist exit from carrier*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Interview†</td>
<td>Cat handling: remove top from carrier*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Interview†</td>
<td>Cat handling: use of scruffing*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Interview†</td>
<td>Cat handling: use of towel wraps*</td>
<td>2</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Interview†</td>
<td>Confidence to offer behaviour advice and/or relationship with behaviourist or trainer†</td>
<td>3</td>
<td>2 – 3.5</td>
</tr>
<tr>
<td>Interview†</td>
<td>Information to prevent behaviour problems in puppies and kittens†</td>
<td>2</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Recognition of aggression in cats</td>
<td>1.5</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Recognition of aggression in dogs</td>
<td>1</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Recognition of fear in cats</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Recognition of fear in dogs</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Recommended and discouraged training methods for puppies and kittens†</td>
<td>3</td>
<td>1 – 3</td>
</tr>
<tr>
<td>Interview†</td>
<td>Use of positive reinforcement</td>
<td>3</td>
<td>2 – 3</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Allow patient time to acclimate prior to interaction</td>
<td>3</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Ask about patient’s response to handling prior to interaction</td>
<td>1</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Examine where patient is most comfortable</td>
<td>4</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Increase surface traction during physical examination</td>
<td>1</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Use of calm, non-threatening approach</td>
<td>4</td>
<td>2 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Use of diverse handling techniques</td>
<td>1</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Use of physical restraint</td>
<td>1</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Use of treats and positive reinforcement</td>
<td>2</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Appointment‡</td>
<td>Use of sedatives or anxiolytics (only as needed)</td>
<td>1</td>
<td>1 – 1</td>
</tr>
</tbody>
</table>

1 Interview responses were scored on a three-point scale, except where indicated by an asterisk (*), corresponding to scoring on a two-point scale. Half-point adjustments were possible for aspects identified with an addition sign (+)
2 Appointments were scored on a five-point Likert scale, from strongly disagree (1) to strongly agree (5)
Figure 5.1: Frequency distribution of veterinarians from 30 veterinary clinics according to their interview response scores to questions regarding behavioural health.

- Approaches to examine an aggressive patient
- Approaches to minimize patient fear
- Confidence to offer behaviour advice and/or relationship with behaviorist
- Information to prevent behaviour problems in puppies and kittens
- Recognition of aggression in cats
- Recognition of aggression in dogs
- Recognition of fear in cats
- Recognition of fear in dogs
- Recommended and discouraged training methods for puppies and kittens
- Use of treats and positive reinforcement

Frequency of veterinarians (%)
Figure 5.2: Frequency of use of various feline handling techniques by veterinarians from 30 veterinary clinics, according to interview responses
Table 5.6: Frequency distribution of veterinary clinics according to the percentage of all appointments in which various handling techniques were employed by veterinary staff, based on 152 appointments from 30 veterinary clinics

<table>
<thead>
<tr>
<th>Handling aspect</th>
<th>Proportion of appointments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-20%</td>
</tr>
<tr>
<td>Allow patient time to acclimate prior to interaction</td>
<td>9</td>
</tr>
<tr>
<td>Ask about patient’s response to handling prior to interaction</td>
<td>28</td>
</tr>
<tr>
<td>Examine where patient is most comfortable</td>
<td>4</td>
</tr>
<tr>
<td>Increase surface traction during physical examination</td>
<td>20</td>
</tr>
<tr>
<td>Use of calm, non-threatening approach</td>
<td>0</td>
</tr>
<tr>
<td>Use of diverse handling techniques</td>
<td>26</td>
</tr>
<tr>
<td>Use of physical restraint</td>
<td>26</td>
</tr>
<tr>
<td>Use of rewards and positive reinforcement</td>
<td>13</td>
</tr>
<tr>
<td>Use of sedatives or anxiolytics (only as needed)</td>
<td>30</td>
</tr>
</tbody>
</table>

A technique was considered employed if it received a score of 4 or greater, on a five-point Likert scale. When both technicians and veterinarians handled patients, the lowest score was considered for descriptive statistics.
Table 5.7: Handling techniques employed by veterinary staff during 90 canine appointments from 30 veterinary clinics, according to patient behaviour

<table>
<thead>
<tr>
<th>Handling technique</th>
<th>Fearful (n = 42)</th>
<th>Neutral (n = 48)</th>
<th>All canine patients (n = 90)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>% Appt.</td>
<td>No.</td>
</tr>
<tr>
<td>Attempt to examine off table¹</td>
<td>16</td>
<td>40.0%</td>
<td>24</td>
</tr>
<tr>
<td>Examine on table¹</td>
<td>24</td>
<td>60.0%</td>
<td>15</td>
</tr>
<tr>
<td>Use of Elizabethan collar</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Use of gloves</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Use of muzzle or mask</td>
<td>2</td>
<td>4.7%</td>
<td>2</td>
</tr>
<tr>
<td>Use of pheromones</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Use of towel or blanket wrap</td>
<td>0</td>
<td>0.0%</td>
<td>1</td>
</tr>
<tr>
<td>Use of toy</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

¹ Based on examination by a veterinarian, which was performed in 79 canine appointments (40 fearful, 39 neutral). In the other 11 appointments, a technician performed the examination, or no examination was performed.
Table 5.8: Handling techniques employed by veterinary staff during 62 feline appointments from 30 veterinary clinics, according to patient behaviour

<table>
<thead>
<tr>
<th>Handling technique</th>
<th>Fearful (n = 47)</th>
<th>Aggressive (n = 3)</th>
<th>Neutral (n = 12)</th>
<th>All feline patients (n = 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempt to examine off table¹</td>
<td>5</td>
<td>11.4%</td>
<td>2</td>
<td>66.7%</td>
</tr>
<tr>
<td>Examine on table¹</td>
<td>39</td>
<td>88.6%</td>
<td>1</td>
<td>33.3%</td>
</tr>
<tr>
<td>Use of Elizabethan collar</td>
<td>1</td>
<td>2.1%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Use of gloves</td>
<td>1</td>
<td>2.1%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Use of muzzle or mask</td>
<td>3</td>
<td>6.4%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Use of pheromones</td>
<td>3</td>
<td>6.4%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Use of scruffing</td>
<td>1</td>
<td>2.1%</td>
<td>1</td>
<td>33.3%</td>
</tr>
<tr>
<td>Use of towel or blanket wrap</td>
<td>7</td>
<td>14.9%</td>
<td>2</td>
<td>66.7%</td>
</tr>
<tr>
<td>Use of toy</td>
<td>1</td>
<td>2.1%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Allow time to exit carrier on own²</td>
<td>23</td>
<td>60.5%³</td>
<td>3</td>
<td>100.0%³</td>
</tr>
<tr>
<td>Assist exit from carrier (i.e. tip carrier, lift, pull or scruff)</td>
<td>27</td>
<td>71.1%³</td>
<td>2</td>
<td>66.7%³</td>
</tr>
<tr>
<td>Remove top from carrier</td>
<td>7</td>
<td>16.3%⁴</td>
<td>0</td>
<td>0.0%⁴</td>
</tr>
</tbody>
</table>

¹ Based on examination by a veterinarian, which was performed in 57 feline appointments (44 fearful, 3 aggressive, 10 neutral). In the other 5 appointments, a technician performed the examination, or no examination was performed.
² Includes providing unlimited time to exit, and providing some time prior to assistance with removal from carrier.
³ Denominator excludes appointments in which the owner removed the animal from the carrier (n = 12).
⁴ Denominator excludes appointments in which the owner removed the top from the carrier (n = 7).
Animal welfare encompasses biological functioning (e.g. physical health), affective states (e.g. absence of fear), and natural living (e.g. the ability to perform natural behaviours) (Fraser et al 1997). Optimizing animal welfare includes both reducing negative welfare and promoting positive welfare; in other words, good animal welfare not only involves minimizing negative affective states, outcomes or situations (e.g. low rates of injury, reduced pain) but also maximizing positive affective states, outcomes of situations (e.g. good physical health, pleasure, play) (Boissy et al 2007, Mellor 2012). On-site animal welfare assessment (e.g. on farm) can be challenging, and formal animal welfare assessment programs tend to make use of at least one of three types of measures: animal-based measures (e.g. behaviour), resource-based measures (e.g. surface traction), and/or management-based measures (e.g. standard operating procedures) (Barnett & Hemsworth 2009, Bracke 2007, Johnsen et al 2001). Regardless of the type of measure used, any animal welfare measure should be highly reliable between and within observers, valid with respect to the phenomenon it is attempting to measure, and feasible to use in practice (Knierim & Winckler 2009, Martin & Bateson 1993). Multiple animal welfare measures can be combined into an overall animal welfare assessment scheme. A large number of these schemes have been developed for the on-farm welfare assessment of agricultural animals (e.g. Welfare Quality®, TGI-200, American Humane Certified™, Freedom Food), each differing in their measures, standards, formats and applications (Blokhuys et al 2003, Blokhuys et al 2010, Botreau et al 2007, Fraser 2006, Main et al 2003). Companion animal welfare assessment has to date received far less attention, and no in-clinic welfare assessment schemes currently exist.
Dogs and cats exhibit physiological and behavioural signs of stress, fear, and pain while visiting veterinary clinics, suggesting that their welfare can be impaired while receiving veterinary care. Moreover, a number of areas of veterinary medicine, such as veterinary-client communication, pain assessment and management, staff-patient interaction and handling, and the physical environment of the clinic itself, have the potential to positively and/or negatively impact patient welfare. Furthermore, canine and feline welfare can be impacted by veterinary care both while the animal remains in the veterinary clinic and once the animal returns to its home. However, there is currently a gap in research investigating the impact of veterinary care on overall companion animal welfare. This thesis aimed to address this gap by exploring canine and feline welfare related to veterinary care, and developing and evaluating a welfare assessment scheme for use in companion animal veterinary clinics.

**Key findings**

Through a multi-stage survey with animal welfare researchers, veterinary experts in animal welfare, and practicing veterinarians, 85 veterinary-related factors that impact canine and feline welfare both in the clinic and in the home environment were identified (Chapter 2, thesis objective 1). These factors encompassed seven themes: physical environment, routine animal care, staff-patient-client interactions, clinic management, medical and surgical procedures, staff attitudes and education, and veterinary staff-client communication. In total, 60 of these factors were thought to have considerable impact on patient welfare, and were thus included in a draft welfare assessment scheme (thesis objective 2). Factors thought to have the largest impact on companion animal welfare in the clinic setting included the ability to recognize, evaluate and interpret species-specific animal behaviours and the optimization of analgesic regimes.
Veterinary care-related factors considered to have the largest impact on welfare in the home environment included post-surgical and chronic pain control, communication regarding appropriate socialization, handling and training, and communication of information concerning animals’ basic needs (e.g. exercise requirements). For seven factors, animal welfare researchers rated their welfare impact as significantly different than did practicing veterinarians and veterinary experts in animal welfare. These factors were: ventilation and air quality, client emotion, separation from owner and other conspecifics, lack of sense of control, communication: basic animal behaviour, communication: veterinary preventive care, staff ability and willingness to answer questions.

The draft assessment scheme was then evaluated for reliability, validity, and feasibility in thirty companion and mixed animal veterinary clinics in southern Ontario (Chapters 3, 4, and 5; thesis objective 3). Questionnaires were only used to assess communication, and for all assessment items combined, inexperienced, trained observers showed almost perfect agreement with the experienced observer for inter-observer reliability ($K_w = 0.86, 0.93$) and almost perfect agreement for intra-observer reliability for the experienced observer ($K_w = 0.95$). Interviews were used to assess communication, pain management and behavioural health. In terms of inter-observer reliability, the scoring of interview responses by the two inexperienced, trained observers showed fair and moderate agreement with the experienced observer for communication ($K_w = 0.40, 0.44$), substantial and almost perfect agreement for pain management ($K_w = 0.83, 0.73$), and almost perfect agreement for behavioural health ($K_w = 0.82, 0.81$). In terms of intra-observer reliability, the scoring of interview responses showed almost perfect agreement across all three major topics ($K_w = 0.81$ for communication, $K_w = 0.92$ for pain management, $K_w = 0.95$ for behavioural health). Veterinary appointment observations via video
recordings were used to assess veterinary-client communication and behavioural health. Inter-observer reliability showed substantial agreement for both communication ($K_w = 0.61, 0.64$) and behavioural health ($K_w = 0.74, 0.70$). Intra-observer reliability showed substantial agreement for communication ($K_w = 0.80$) and almost perfect agreement for behavioural health ($K_w = 0.84$). While overall inter- and intra-observer reliability was reasonable, reliability of individual items within each topic varied greatly. Overall, inter-observer reliability was generally highest for welfare assessment using questionnaires, although questionnaires were only used to assess communication. Intra-observer reliability was high across all three assessment methods.

There were a number of discrepancies between responses given through questionnaires and interviews in comparison to data collected from veterinary appointment observations, suggesting that questionnaires and interviews might have lower validity than video appointment observation as an assessment method. For instance, communication of key welfare-related information with clients was observed to occur at a low frequency in veterinary appointments when compared to the level suggested by veterinarians based on questionnaire and interview responses. Similarly, veterinarian interview responses related to practices used to manage behavioural health were inconsistent with practices used during veterinary appointments. This was particularly true for the methods used to remove cats from carriers, and the use of towel wraps and scruffing with feline patients. Nonetheless, interviews appear to have the highest feasibility; interviews were completed with every participating veterinary clinic, whereas questionnaires were only returned by 27 veterinary clinics, and six veterinary appointments (3 canine, 3 feline) could only be video recorded in 10 veterinary clinics. Given the difficulty in video recording an adequate number of veterinary appointments and the time required to
complete analysis of this data, appointment observation would have particularly low feasibility as part of a larger scale assessment.

Finally, the evaluation of this welfare assessment scheme in companion and mixed animal veterinary clinics also allowed for the collection of information regarding current practices related to animal welfare, which can be used for benchmarking, and as a baseline for improvement (thesis objective 4); a number of strengths and areas that offer opportunity for enhancement were thus identified. With the exception of veterinary preventive care, veterinary clinic staff members engaged in low levels of proactive discussion of a number of important topics, including animal behaviour, training and socialization, chronic pain, and infectious diseases. As proactive discussion is characterized by initiation by the veterinarian rather than the owner, this highlights a missed opportunity for veterinarians and other staff members to educate their clients regarding proper care, behaviour, and welfare of their pets. With respect to pain management, veterinary clinics seem to consistently provide pre-emptive and post-surgical analgesia for ovariohysterectomies, have extensive follow-up routines, and provide clear home care instructions for owners. Conversely, veterinary clinics underused objective tools to identify chronic pain in dogs and cats, and postoperative pain in dogs, and in comparison to recent recommendations, postoperative analgesia provided to owners after ovariohysterectomy was not of sufficient duration. Overall, this has the potential to result in insufficient pain management for many animals. Lastly, in terms of behavioural health, veterinarians were confident to provide advice regarding behaviour and training, often had a relationship with a behaviour professional to allow for referral, and used a non-threatening approach when greeting and examining patients. On the other hand, a large number of veterinarians provided insufficient indicators of aggression in cats and dogs, failed to provide appropriate information on the prevention of behaviour
problems in puppies and kittens, and generally underused low-stress handling techniques, despite the fact that roughly one half of dogs and three quarters of cats exhibiting multiple signs of fear. As such, there is opportunity for enhancement in welfare-related practices across a variety of areas.

**Major contributions**

Research into the welfare assessment of cattle, pigs and chickens has been extensive, and many practical on-farm welfare assessment schemes are currently in use. Despite the increasing attention to methods for practical welfare assessment, and the link between veterinary care and animal welfare, overall welfare assessment had not previously been investigated in veterinary clinics. This research is the first attempt to develop and evaluate a canine and feline welfare assessment tool for use in companion animal veterinary clinics. During initial development of this tool, stakeholder groups (i.e. researchers, veterinarians with and without welfare expertise) were consulted such that their interests and viewpoints could be incorporated; this followed a similar methodology to that used during the initial development of the Welfare Quality® protocols (Blokhuis et al 2003). A ‘bottom up’ approach was also used, whereby measures were individually assessed prior to inclusion, as has been suggested by Rousing and colleagues (2001). The resulting tool is inclusive in terms of addressing the various aspects of animal welfare that have been previously discussed (i.e. affective state, natural behaviour and health; Fraser et al., 2006), and is broadly applicable with the potential to assess clinics for a number of different applications. For one, it could be used to suggest non-mandatory guidelines for managing a veterinary clinic in a welfare-friendly manner. Veterinarians and veterinary staff members could then use the tool for self-assessment to identify areas that could benefit from
attention and enhancement. By going through the self-assessment process, veterinary clinic staff members would also be educated regarding animal behaviour and welfare, including practices that impact their patients’ welfare, which would likely lead to improvements in patient welfare. For example, after educating commercial stockpersons about pig behaviour and productivity as well as providing posters to display on site, Hemsworth and colleagues (1994) found significant improvements in stockpersons attitudes and behaviour towards pigs, in addition to reduced levels of pig fear towards humans. In addition to these improvements in patient welfare, by employing welfare-friendly practices as well as recognizing and appropriately responding to animal behaviours, veterinary clinic staff could also provide a higher level of care, be more efficient and productive, and improve client satisfaction and compliance. Secondly, the assessment scheme could also be formatted into a voluntary certification program. Participating veterinary clinics could advertise with a welfare-friendly label, which would provide pet owners with assurance that the clinic had passed a formal assessment program. The stress of visiting the veterinary clinic, both for the pet and for the owner, has been cited as one of the top client-driven factors explaining the recent decline in veterinary visits, particularly for cat owners (Volk et al. 2011). As such, the implementation of this tool into a formal assessment program may reassure pet owners that their pet would have a positive experience during their veterinary visit, and may help to increase regular veterinary visits. The American Animal Hospital Association (AAHA) Accredited® program is a voluntary certification program that currently lacks complete coverage of animal welfare; however, the scheme developed through this thesis would complement this program well, and enable an expansion to the inclusion of an assessment of animal welfare. Regardless of the format employed, the use of a welfare assessment tool has been shown to lead to welfare improvements in other species, so is likely to also lead to improvements in patient welfare.
welfare in veterinary clinics. For instance, Vasseur and colleagues (2010) noted that many dairy producers voluntarily made welfare-related management changes six months after their calf management practices were assessed using an advisory tool. Veterinary clinics who participate in

This research was also the first to evaluate overall canine and feline welfare in relation to veterinary care. Through visits to thirty veterinary clinics in Ontario, information regarding the current use of practices that impact patient welfare was collected using mostly management- and resource-based measures, and animal-based measures for behavioural health. In doing so, strengths and weaknesses, with respect to established best practices, were identified. Therefore, research results contribute data regarding baseline practices, which allows for the measurement of changes and improvement over time. Moreover, areas generally not in line with current industry standards represent opportunities for education and training. Continuing education and other formal training opportunities could provide guidance to veterinarians and other staff members to mitigate these weaknesses and promote welfare-friendly practices. Moreover, this information might highlight potential gaps in veterinary and veterinary technician curriculums, and can, thus, aid with curriculum development to ensure that student veterinarians and student veterinary technicians are equipped with these skills prior to entering into veterinary practice.

Finally, this assessment scheme has focused not only on discouraging veterinary routines that can negatively impact welfare, but also encouraging routines that promote positive patient welfare; this is in line with an increasing discussion of positive welfare within the animal welfare field.
**Study limitations**

As with most research, the studies described in this thesis are not without limitations. For one, both the multi-stage survey (Chapter 2) and in-clinic scheme evaluation (Chapters 3, 4, and 5) depended entirely on the voluntary participation of animal welfare researchers and veterinarians. As such, two types of selection biases are likely to have impacted the results. Volunteer or self-selection bias might be present if those who chose to participate differed from those who did not participate. Volunteer participants might differ in a number of characteristics, including a higher interest and degree of involvement in both research and animal welfare compared to those who decided not to participate. As a result, the knowledge and attitudes of the sample population might differ from those of the general population. Non-response bias is related, and reflects the reverse of self-selection bias: research results can be biased if those who declined invitations differ from those that accepted invitations to participate. For instance, veterinary clinic owners who declined participation for in-clinic assessment may have been less confident that their animal welfare practices were consistent with current best practices. Veterinary clinic owners who declined participation might have also been busier and might not have recognized the value in dedicating time to research. Although these selection biases might have decreased the external validity of the descriptive results, their impact would be reduced for a formal assessment scheme as participants would either have incentive to participate (e.g. a certification scheme), or participation would be mandatory.

Information bias, including recall bias and social desirability bias, might have also impacted the responses given via questionnaires and interviews. Information bias could have decreased the likelihood of questionnaire and interview measures accurately reflecting real practices; however, this bias would have likely been consistent across all participants.
Furthermore, the recruitment process involved extensive effort, and it was often challenging to recruit a sufficient number of participants. Although a random selection of practicing veterinarians was invited to complete the multi-stage survey, the response rate was particularly low amongst these veterinarians in private practice. For the portion of this thesis that involved clinic visits, a sufficient number of clinics were eventually recruited; however, invitations had to be sent to all veterinary clinics matching the selection criteria in order to reach the desired sample size, resulting in a non-random sample. All in all, issues with selection bias and non-random sampling might limit the representativeness and generalizability of the research results.

The in-clinic welfare assessment scheme developed through this thesis included mostly management-based measures, and some resource-based measures of animal welfare. Animal-based measures of fear and aggression were used to evaluate the context in which handling techniques were employed. Nonetheless, the scheme relies heavily on indirect measures to assess companion animal welfare in veterinary clinics; it rarely uses animal-based measures, and therefore does not directly measure patient welfare. Many animal welfare scientists (e.g. Edwards 2007, Knierim & Winckler 2009, Waiblinger et al 2001) have criticized welfare assessments that exclude animal-based measures. Although this is an obvious limitation to the present welfare assessment scheme, the inclusion of animal-based measures is much more complicated for in-clinic assessments for dogs and cats compared to on-farm assessments for agricultural animals. Dogs and cats brought into veterinary clinics spend a relatively short amount of time in the clinic setting, and have a variety of backgrounds and conditions that are only partly influenced by veterinary advice and the clinic itself; this differs from cows, pigs and chickens, which spend extended periods of time in the location where their welfare is assessed and tend to be subject to more uniform husbandry. As such, animal-based measures for dogs and
cats might not exclusively reflect their current welfare state as it relates to the veterinary environment. For instance, animal behaviour is a key animal-based measure, yet the behaviour of dogs and cats in veterinary clinics can be affected by a number of factors unrelated to the welfare practices used by that veterinary clinic; examples include health status, owner interactions, socialization, training, breed, genetics, and previous experiences in the current or other veterinary clinics. Accordingly, behaviours indicative of fear, for example, are not likely to be entirely dependent on the current experience and as such, are not a specific indicator of welfare state as a consequence of receiving veterinary care from that particular clinic. Beyond these issues, the inclusion of animal-based measures might further constrain the feasibility of the assessment tool by increasing the amount of time required to complete an on-site assessment and necessitating an owner permission process. Subsequently, although a limited inclusion of animal-based measures is a study limitation, it also reflects a significant difference between welfare assessment for agricultural and companion animals.

**Suggestions for future research**

Before the welfare assessment scheme developed in this thesis can be formally implemented, additional research examining test-retest reliability, and the best method through which to aggregate individual measure scores into an overall score or outcome are necessary. This thesis has evaluated the scheme’s inter- and intra-observer reliability; however, test-retest reliability has not yet been assessed. Test-retest reliability reflects the agreement between scores when an assessment is repeated over two or more occasions (Meagher 2009). If a welfare assessment scheme is to be used as part of a formal program, the outcome should not depend on the occasion that the assessment is made, particularly if there are consequences for lack of
compliance. In other words, scores should remain relatively consistent over time, assuming no major infrastructure or management changes, or efforts to improve practices have been made. It is, therefore, important to ensure that the scheme has high test-retest reliability. Approximately half the veterinary clinics that participated in the in-clinic research outlined in this thesis were involved in a second visit by the research team, during which questionnaires, interviews, and appointment observations were repeated. As such, data is available to investigate test-retest reliability, and the results of this analysis should be incorporated into the assessment tool.

Future work should also produce a final assessment tool by accounting for all reliability, validity and feasibility information discussed here. If modifications to the scoring schemes do not improve the reliability of measures that have been demonstrated to have poor reliability, these measures should be removed and replaced with suitable alternates. A number of alternative assessment measures could have been used, but were not assessed here. For example, veterinarians could have been provided with vignettes of various situations (e.g. photos of fearful or painful cats or dogs) and asked how they would assess and respond to the patient. These types of measures may have higher validity than questionnaire or interview-based measures, but may also be more feasible than appointment observation. In short, questionnaires, interviews and videos of appointments were used as they were most similar to the methodology used in farm animal welfare assessment schemes, but alternative methods of assessment may also be suitable for the veterinary clinic environment and could be further explored in future studies.

As a whole, the final assessment tool should focus on measures with great variability across veterinary clinics as they are ideal for differentiating between participating clinics. Additionally, overall goals should be both ambitious yet achievable, such that veterinary clinics remain motivated to participate, while setting appropriate standards that clinics must achieve in
order to reach the ‘acceptable’ or ‘excellent’ assessment outcome level. The final assessment tool should also be evaluated in a larger population of veterinary clinics (e.g. across multiple Canadian provinces), which would enable the determination of appropriate cut-points, as well as evaluate the tool’s ability to be used in various types of clinic settings (e.g. clinics with few vs. many veterinarians on staff).

Moreover, the aggregation of scores into an overall assessment outcome would also be required prior to the scheme’s inclusion in a formal assessment program. The method used to calculate a final outcome score would depend on the format and goals of the assessment. If the goal were to assess veterinary clinics with respect to minimum standards, then an aggregate overall score would likely be a sum of the number of minimum standards met. If the goal were to assess veterinary clinics for inclusion in a certification program, a certain number of standards would likely be required to attain the excellent level. In either case, the number or proportion of measures that must reach the minimum standard or an excellent score in order to pass the assessment should be evaluated. For example, it would be necessary to explore the proportion of veterinary clinics that would pass the assessment should participants be required to attain excellent scores for 40% versus 60% of the individual measures. This process becomes further complicated if the outcome were non-binary (e.g. if possible final outcomes included fail, low pass, or high pass). Furthermore, the impact of the ability for high scores in some areas to compensate for low scores in others should also be evaluated. Overall, the effects of different methods of scoring aggregation should be mathematically explored to provide evidence for these types of overall scoring decisions. During its development, Welfare Quality® mathematically evaluated the effects of different configurations using mathematical formulas for scoring
aggregation (Botreau et al 2009); future research should thus incorporate a similar methodology to provide conclusions about scoring aggregation.

The current welfare assessment scheme focuses mainly on assessing animal welfare during veterinary appointments, either through direct observation or via questions asked through questionnaires or interviews. Nonetheless, patient welfare might also be impacted by human-animal interactions in the treatment area, or by the design of housing facilities for hospitalized patients. Many dogs and cats are often moved out of the examination room to the treatment area for procedures (e.g. blood draw, anal gland expression). Moreover, surgical patients are likely to be moved directly to the treatment or hospitalization area, and would not be captured in examination rooms. Although efforts were made to assess veterinary-patient interaction in the treatment area, sample sizes were too small to properly investigate welfare. Similarly, the resources provided to hospitalized patients, such as the ability to hide or perch at an elevated location, were not assessed during this thesis, yet scientific literature from the shelter and laboratory environment suggests that in-cage resources can have a significant impact on canine and feline welfare. As an additional aspect of the patient experience, an animal welfare assessment scheme could also incorporate assessment of interactions in the treatment area, and resources provided to hospitalized patients. Future research would be required to identify the best method to incorporate this into the current welfare assessment scheme. Moreover, many aspects of clinic management were identified in the multi-stage survey (e.g. written protocols and procedures for various situations), but these have largely not been discussed here. Data concerning these factors has been collected, and should be reviewed and formally evaluated for validity, reliability and feasibility such that it can also be incorporated into this assessment scheme.
Finally, there is a need to evaluate whether the welfare-friendly practices promoted through this assessment scheme would lead to measureable improvements in canine and feline welfare. Overall, the scoring guidelines and standards set through this assessment scheme are based on published guidelines and scientific opinions, so the resulting tool is expert-validated and has content validity. On the other hand, in some cases, the encouraged or discouraged practices have not been scientifically validated (e.g. use of towel wraps). Criterion validity, or the correlation between the proposed measures and a ‘gold standard’ (i.e. animal-based measures), thus warrants further investigation (Meagher 2009). There is a need to confirm that the management- and resource-based measures included lead to a measurable change in animal welfare based on direct, animal-based measures. For instance, there is a need to evaluate that the provision of information and advice regarding pet care and welfare leads to improved animal care and welfare in the animal’s home. There is also a need to confirm that there are differences in animal outcomes when insufficient, acceptable, or excellent practices are employed. To improve control over potential confounding or intervening variables, and mitigate the issues with animal-based measures discussed above, it is likely most suitable to use laboratory dogs and cats for these evaluations. Similarly, at the overall tool level, there is also a need to validate that the welfare of patients at high scoring veterinary clinics is better than the welfare of patients at low scoring veterinary clinics. In other words, the overall ability of the tool to predict and ensure patient welfare should be explored, as has been done for other welfare assessment schemes that do not include animal-based measures (i.e. RSPCA Freedom Foods, ANI-200) (Main et al 2003, Mollenhorst et al 2005).

Overall, veterinary care has the potential to impact animal welfare in a number of ways, yet this link has to date remained relatively unexplored. This thesis aimed to address this gap by
exploring canine and feline welfare related to veterinary care. Results from a survey of animal welfare researchers and veterinarians permitted the development of a welfare assessment scheme for companion animal veterinary clinics. This tool was then evaluated for reliability, validity and feasibility in thirty companion animal veterinary clinics. This in-clinic evaluation also revealed a number of strengths and opportunities for enhancement, with regards to patient welfare, amongst Ontario veterinary clinics. This thesis was the first attempt to develop a welfare assessment tool for veterinary clinics, and the first attempt to evaluate companion animal welfare with respect to veterinary care. The resulting tool has the potential to be used in a variety of applications to encourage the improvement of the welfare of dogs and cats who visit primary care veterinary practices.
References


APPENDIX I

Invitation to participate in multi-stage expert survey

Subject: OVC study – factors affecting animal welfare in companion animal veterinary clinics

Message body:

Dr. Lee Niel, Assistant Professor in the department of Population Medicine at the Ontario Veterinary College, University of Guelph, would appreciate your participation in a study she and a graduate student are conducting on the assessment of animal welfare in companion animal veterinary clinics (REB # 12JA032). This research project aims to identify the factors believed to affect the welfare of cats and dogs within a clinic setting. The Delphi technique, whereby a consensus of opinion is achieved through multiple rounds of consultation with experts, will be employed to determine which factors are universally believed to have an impact on companion animal welfare within a veterinary setting.

Please note that:
- All information provided will be confidential.
- You are NOT required to participate in this survey.
- Participants will be consulted over three rounds, with each round requiring approximately 20 to 25 minutes to complete. The study will last approximately four months in total.

If you choose to participate in this study, please go to the secure survey site by clicking HERE.

If you have any questions or concerns, Dr. Niel may be reached at:

Lee Niel, PhD
Department of Population Medicine
Ontario Veterinary College
University of Guelph
Guelph, ON, N1G 2W1
Tel: 519-824-4120, Ext. 53030
Fax: 519-763-8621
Email: niell@uoguelph.ca
APPENDIX II

Consent form for participants of multi-stage expert survey

UNIVERSITY OF GUELPH

CONSENT TO PARTICIPATE IN RESEARCH

A study of the factors affecting animal welfare within companion animal veterinary clinics.

You are asked to participate in a research study conducted by Dr. Lee Niel and Lauren Dawson from the Department of Population Medicine at the University of Guelph.

If you have any questions or concerns about this research, please feel free to contact Dr. Niel at 519-824-4120 x53030 or niell@uoguelph.ca, or Lauren Dawson at 519-824-4120 x54775 or dawsonl@uoguelph.ca.

PURPOSE OF THE STUDY

Despite the obvious health benefits of veterinary care, individual welfare of cats and dogs may be affected by fear and stress associated with visits to the veterinarian. Furthermore, veterinarians play a crucial role in the welfare of animals within the home environment through professional advice provided on a range of topics. Given that the welfare of companion animals within a clinic setting remains relatively unexplored, this project aims to determine the clinic level factors widely considered to impact welfare within veterinary clinics and in the home environment. We are thus consulting with experts, and veterinarians regarding their opinions on these factors to eventually produce a list of factors with widespread consensus among stakeholders.

PROCEDURES

If you volunteer to participate in this study, we would ask you to be aware of the following things:

For the current study, animal welfare experts as well as practicing veterinarians across Canada and the United States are asked to provide their opinions regarding the welfare of cats and dogs within veterinary clinics. As a participant in this study, you will be contacted across three rounds of consultation, each requiring 20 - 30 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

This study poses no physical risk to participants. Participants may worry that the information they provide may reflect badly upon themselves or their profession, however all information provided by participants will be kept confidential and responses from individual participants will only be available to the immediate research group. Responses will not be shared with employers, colleagues, or clients of the veterinary clinic where you are employed (where applicable).

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

This research will not provide any direct benefits to participants. Both the scientific and veterinary communities will benefit from an improved understanding of the issues widely considered to impact animal welfare within veterinary clinics. Information gained will be used to build a survey to assess the current welfare state within companion animal clinics across North America. It may also be used to develop a welfare assessment scheme for veterinary clinics.
PAYMENT FOR PARTICIPATION

There is no payment for participation in this study.

CONFIDENTIALITY

Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study.

Participants will be asked to provide certain information about themselves (e.g. gender, age, professional affiliations) so participant identity will not be anonymous. All information recorded will be kept either on an encrypted, password protected computer or in a locked file cabinet and only be viewed or handled by members of the research team. Individuals will not be individually identified in the final product, ensuring that results are kept confidential. Data will be destroyed after ten years.

PARTICIPATION AND WITHDRAWAL

Participation in this study is completely voluntary. If you volunteer to be in this study, you may refuse to answer any question and you may withdraw from the study at any time without any consequences. Should you wish to withdraw after completing and returning the survey, you may have your responses removed by contacting Dr. Lee Niel or Lauren Dawson at the contact information provided above.

RESEARCH RESULTS

Results of this study may be published in a scientific journal. If you wish to receive a copy of any publications resulting from this study, or a report of the final results, please provide your email address below.
Your email address will be used exclusively for this purpose.

Email address of participant: __________________________________________

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, please contact:

Research Ethics Coordinator
Room 437 University Centre
University of Guelph
50 Stone Road E.
Guelph, ON N1G 2W1
Telephone: (519) 824-4120, ext. 56606
E-mail: sauld@uoguelph.ca
Fax: (519) 821-5236

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I have read the information provided for the study “The factors affecting animal welfare within companion animal veterinary clinics” as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

________________________________________
Name of Participant (please print)

________________________________________
Signature of Participant

________________________________________
Date
Dear Dr. X,

Dr. Lee Ni at the Ontario Veterinary College would appreciate your participation in a research project that she and Lauren Dawson (PhD Candidate) are conducting on companion animal well-being in relation to veterinary care (Research Ethics Board #13JN017). This research is being completed in collaboration with Drs. Cate Dewey and Michele Guerin, OVC faculty members, and Dr. Elizabeth Stone, OVC Dean.

Veterinarians have a leading role in ensuring overall animal health and well-being; they are responsible for preventative health care and diagnosis and treatment of injury and disease, and they also play a critical role in ensuring the well-being of animals in the home environment. However, veterinary treatment is also associated with animal stress and pain. For example, during clinic visits animals must interact with unfamiliar people, animals and environments, and undergo a range of potentially stressful and painful procedures. Despite the obvious potential for negative impacts on animal well-being, there has been limited research in this area and we know very little about the standards of animal well-being in veterinary clinics in North America. Our research is aimed at developing a practical and reliable tool for the assessment of animal well-being in companion animal veterinary clinics. We have developed a draft tool based on input from veterinary and animal welfare experts, and the current project will assess whether the proposed standards and measures are practical for veterinary staff, and whether they can be reliably measured across multiple visits by different members of the research team.

As a participating clinic, a team of two research members (one graduate student, one assistant) will visit on two occasions, roughly one month apart. Prior to each visit, we will ask you to complete a pre-questionnaire which will improve our efficiency during the clinic visit. Each clinic visit will include 1) a tour of the facilities; 2) video recording of appointments (ideally 3 feline and 3 canine) and the treatment area to assess animal responses to treatment - we will set up cameras, but do not need to be in the room 3) an interview with one staff member. Each visit will take approximately 4 hours, but much of this time will be spent observing from a distance and we will make every effort not to interrupt your normal operations. In return, we will provide a free feedback report. All information collected will remain strictly confidential and will only be accessible to the direct research team, and clinic and personal identities will never be shared or reported.

Please take a moment to let us know if you are interested in participating, or if you would prefer not to be contacted again about this project. You can send a brief reply by any of the following methods:
1. Email Lauren Dawson at dawsonl@uoguelph.ca, and include preferred contact information.
2. Telephone Lauren Dawson or Brittany Lostracco at 519-824-4120, extension 54595.
3. Complete the attached document and fax it to 519-763-8621.

Thank you for your time, and we look forward to hearing from you.

Sincerely,

Dr. Lee Niel
Assistant Professor, Ontario Veterinary College
TO: Attention to Dr. Lee Niel

FAX: 519-763-8621

Please mark one of the two statements below:

☐ I am interested in potentially participating in the veterinary care and animal well-being study being run by the University of Guelph. My contact information is as follows:

Name: ___________________________________________________________

Clinic name: _____________________________________________________

Preferred form of contact (please select one):

☐ Telephone number: __________________________ Best time(s) to call: ______

☐ Email address: _________________________________________________

☐ I am not interested in participating in this study at this time.

Clinic name: _____________________________________________________

THANK YOU!
APPENDIX IV

Consent form for clinic visits: veterinary clinic staff participants

Development of an animal well-being assurance program for small animal veterinary clinics

You are asked to participate in a research study conducted by Drs. Lee Niel (Principal Investigator), Cate Dewey, Elizabeth Stone and Michele Guerin (faculty members), and Lauren Dawson (PhD Candidate) from the Ontario Veterinary College at the University of Guelph. Data will be collected to contribute to the PhD dissertation of Lauren Dawson.

If you have any questions or concerns about this research, please feel free to contact: Dr. Niel at 519-824-4120 x53030 or niell@uoguelph.ca or Lauren Dawson at 519-824-4120 x54595 or dawsonl@uoguelph.ca.

PURPOSE OF THE STUDY
Veterinarians have a leading role in ensuring overall animal health and well-being; they are responsible for preventative health care and diagnosis and treatment of injury and disease, and they also play a critical role in ensuring the well-being of animals in the home environment. However, veterinary treatment is also associated with animal stress and pain. For example, during clinic visits animals must interact with unfamiliar people, animals and environments, and undergo a range of potentially stressful and painful procedures. Despite the obvious potential for negative impacts on animal well-being, there has been limited research in this area and we know very little about the standards of animal well-being in veterinary clinics in North America. Our research is aimed at developing a practical and reliable tool for the assessment of animal well-being in companion animal veterinary clinics. We have developed a draft tool based on input from veterinary and animal well-being experts, and the current project will assess 1) whether the proposed standards and measures are practical for veterinary staff, and 2) whether they can be reliably measured across multiple visits by different members of the research team. In order to investigate this, we are visiting a number of veterinary clinics across Southwestern Ontario.

PROCEDURES
In order to assess the practicality and reliability of our measures, we need to visit participating clinics on two occasions, roughly one month apart. During each visit, we will video record ongoing appointments with veterinarians (ideally at least three appointments for both cats and dogs), observe animals in the treatment area, tour the facilities, and conduct brief interviews with staff.

If you volunteer to participate in this study, we would ask for your cooperation with the following:
- Arrange convenient and appropriate dates and times for us to visit your clinic.
- Notify all staff of our visit ahead of time so they are prepared for and comfortable with our presence.
- Have a staff member meet with us upon our arrival and provide a brief tour of the facilities.
- Allow us to place cameras in your examination rooms for recording of appointments. We will need to obtain consent from all clients and staff that are included on the videos.
- Allow us to observe ongoing procedures in the treatment area.
- Have a staff member(s) meet with us for approximately one hour to answer some questions. This portion will be audio recorded to ensure we accurately record your responses.
POTENTIAL RISKS AND DISCOMFORTS
Although we will be in your clinic for a few hours, we will do our best to avoid any interruptions to your normal working schedule. Part of this study involves looking at animal well-being in your clinic. We realize that there is likely much between-clinic variation in the way things are done; at no time will we be making any judgements about you personally. All information collected, including any identifying information for the clinic or personnel, will be kept confidential and will only be accessible to the immediate research group. Additionally, any comments made in reference to other co-workers will not be shared with those individuals, employers or clients. All responses will be compiled, such that it will not be possible to associate responses will specific individuals or clinics.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY
Participating clinics will receive free feedback with regards to the results of the study, which may provide general areas for improvement, as well as an explanation of the survey tool used. In the process, clinic staff may also learn more about the link between animal well-being and veterinary care.

Since this is a relatively unexplored research area, both the scientific and veterinary communities will also benefit. At this time, there has been no investigation of general animal well-being in veterinary settings; results will thus identify ideal strategies currently being used that may help other clinics to improve. Information gained will also aid in the development of an animal well-being assurance program for veterinary clinics, which may be used as a self-assessment through which clinic personnel could identify strengths and areas for improvement and/or it may eventually be used as part of a formal animal well-being assessment program.

PAYMENT FOR PARTICIPATION
There is no payment for participation in this study.

CONFIDENTIALITY
Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study. Participants will be asked to provide certain information about themselves (e.g. training, education) so participant identity will not be anonymous to members of the immediate research group. All information recorded will be kept either on an encrypted, password-protected computer or in a locked file cabinet and only be viewed or handled by members of the research team. Individuals and clinics will not be individually identified in any publications, ensuring that results are kept confidential. Data will be destroyed after ten years.

PARTICIPATION AND WITHDRAWAL
Participation in this study is completely voluntary. You should not feel pressured or coerced into participating by your co-workers, employers or any other individual and we will not share the identity of those who choose to participate with anyone. You will not be penalized in any way if you do not wish to participate. If you volunteer to be in this study, you may refuse to answer any question and you may withdraw from the study at any time without any consequences. Should you wish to withdraw after we have left the clinic, you may have any responses or information removed by contacting Dr. Lee Niel or Lauren Dawson at the contact information provided above.

RESEARCH RESULTS
Results of this study may be published in a scientific journal. If you wish to receive a copy of any publications resulting from this study, or a report of the final results, please provide your email address below.

Your email address will be used exclusively for this purpose.

Email address of participant: ______________________________________

RIGHTS OF RESEARCH PARTICIPANTS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, please contact:
SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE

I have read the information provided for the study “Development of an animal well-being assurance program for small animal veterinary clinics” as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____________________________________
Name of Participant (please print)

_____________________________________
Signature of Participant

_____________________________________
Date
APPENDIX V

Consent form for clinic visits: pet owner participants

UNIVERSITY OF GUELPH

CONSENT TO PARTICIPATE IN RESEARCH: PET OWNER

Development of an animal well-being assurance program for small animal veterinary clinics

You are asked to participate in a research study conducted by Drs. Lee Niel (Principal Investigator), Cate Dewey, Elizabeth Stone, Michele Guerin (faculty members) and Lauren Dawson (graduate student) from the Departments of Population Medicine and Clinical Studies at the University of Guelph. Data will be collected to contribute to the PhD dissertation of Lauren Dawson.

If you have any questions or concerns about this research, please feel free to contact: Dr. Niel at 519-824-4120 x53030 or niell@uoguelph.ca, or Lauren Dawson at 519-824-4120 x54595 or dawsonl@uoguelph.ca.

PURPOSE OF THE STUDY

Veterinarians have a leading role in ensuring overall animal health and well-being; they are responsible for preventative health care and diagnosis and treatment of injury and disease, and they also play a critical role in ensuring the well-being of animals in the home environment. However, veterinary treatment is also associated with animal stress and pain. For example, during clinic visits animals must interact with unfamiliar people, animals and environments, and undergo a range of potentially stressful and painful procedures. Despite the obvious potential for negative impacts on animal well-being, there has been limited research in this area and we know very little about the standards of animal well-being in veterinary clinics in North America. Our research is aimed at developing a practical and reliable tool for the assessment of animal well-being in companion animal veterinary clinics. We have developed a draft tool based on input from veterinary and animal welfare experts, and the current project will assess 1) whether the proposed standards and measures are practical for veterinary staff, and 2) whether they can be reliably measured across multiple visits by different members of the research team. In order to investigate this, we are visiting a number of veterinary clinics across Southwestern Ontario.

PROCEDURES

As part of our visit, we will be recording appointments with veterinarians to understand how animals respond to different types of interactions in the veterinary clinic. As the owner of a pet with a scheduled appointment, we are asking for your permission to record your appointment. If you volunteer to participate in this study, you are not required to perform any additional tasks, however, your appointment, and by association you and your pet, will be video recorded. We will not physically interact with your pet or otherwise interrupt your appointment in any way.

POTENTIAL RISKS AND DISCOMFORTS

This study poses no physical or psychological risk to participants or their pets. All information gained, including video recordings, will be kept confidential and only be made available to members of the immediate research group.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

This research will not provide any direct benefits to participants, however both the scientific and veterinary communities will benefit from an improved understanding of the experience animals have at the veterinary clinic. Results will outline the diversity of techniques used within clinics to manage animal well-being, and provide guidance with regards to strengths and areas for improvement. Information will also aid in the development of an animal well-being assessment tool, which may eventually be implemented into the veterinary industry.
PAYMENT FOR PARTICIPATION
There is no payment for participation in this study.

CONFIDENTIALITY
Every effort will be made to ensure confidentiality of any identifying information (e.g. names, pet breed, age) that is obtained in connection with this study. We will not be directly collecting your personal information, but it may be revealed in the video-recording. Your appointment will be assigned an identification number and will only be referenced by that number. All information recorded will be kept either on an encrypted, password protected computer or in a locked file cabinet and only be viewed or handled by members of the research team. Individuals will not be individually identified in the final product, ensuring that results are kept confidential. Data will be destroyed after ten years.

PARTICIPATION AND WITHDRAWAL
Participation in this study is completely voluntary. If you volunteer to be in this study, you may withdraw from the study at any time without any consequences. Should you wish to withdraw after the appointment has finished, you may have your information removed and appointment recording deleted by contacting Dr. Lee Niel or Lauren Dawson at the contact information provided above.

RESEARCH RESULTS
Results of this study may be published in a scientific journal. If you wish to receive a copy of any publications resulting from this study, or a report of the final results, please provide your email address below. Your email address will be used exclusively for this purpose.

Email address of participant: ____________________________

RIGHTS OF RESEARCH PARTICIPANTS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, please contact:

Research Ethics Coordinator
Room 437 University Centre
University of Guelph
50 Stone Road E.
Guelph, ON N1G 2W1

Telephone: (519) 824-4120, ext. 56606
E-mail: sauld@uoguelph.ca
Fax: (519) 821-5236

SIGNATURE OF RESEARCH PARTICIPANT/LEGAL REPRESENTATIVE
I have read the information provided for the study “Development of an animal well-being assurance program for small animal veterinary clinics” as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

__________________________________________
Name of Participant (please print)

__________________________________________
Signature of Participant

________________________
Date
APPENDIX VI

Scheme for scoring questionnaire responses regarding the discussion of topics related to animal welfare

General notes
- Justify score given for each question in the explanation/notes section of scoring sheet.
- If score could alternatively fall between two categories, choose one but make note of alternate score in scoring sheet.
- If cannot tell from answer (question not answered, response lacking detail or too vague), score as 0 – unclear
  - Only score as unclear if response does not answer question
  - Do not score as unclear if have uncertainty deciding between categories (e.g. 2 vs. 3): pick one, but note that you would alternatively put the other and why.
- If cannot read handwriting, highlight the question number on the scoring sheet.

Questionnaire: communication
1. Which of the following are discussed with clients during routine preventive appointments (check all that apply):

<table>
<thead>
<tr>
<th>Routinely for</th>
<th>If previous problems in patient’s chart</th>
<th>If client suggests possible problem</th>
<th>Other</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Food type and amount</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Body condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Prevention of behaviour problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) New or ongoing behaviour problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Appropriate training methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Dental health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Mental stimulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Pain assessment and management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) Cognitive decline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Score each topic or subsection (a-j) independently according to the following scale:

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Never discuss the topic.</td>
<td>Reactive: if client suggests possible problem OR routine discussion with only puppies and kittens (or any other defined subset of patients)</td>
<td>Proactive: Routine discussion with all patients (dogs, puppies, cats, kittens) Pain assessment and management, cognitive decline: routine discussion with dogs and cats only (do not need to discuss with puppies and kittens) If previous problems in patient’s chart.</td>
</tr>
</tbody>
</table>

If fulfill criteria for two categories, score higher of two.
APPENDIX VII

Scheme for scoring interview responses regarding the discussion of topics related to animal welfare

General notes

- If cannot tell from answer (question not answered, response lacking detail or too vague), score as 0 – unclear
  - Only score as unclear if response does not answer question
  - Do not score as unclear if have uncertainty deciding between categories (e.g. 2 vs. 3): pick one, but note that you would alternatively put the other and why.
- Score each question according to answers given to that question ONLY – do not look to responses to other questions for additional information.
  - If interviewer mentions that question has been previously answered and does NOT ask question fully, score section where question had been answered.
  - If interviewee refers to response to other question as answer, score answer from that section.
- Justify score given for each question in the explanation/notes section of scoring sheet.
- If score could alternatively fall between two categories, choose one but make note of alternate score in scoring sheet.

Interview: communication

A. Preventive Care

For all subsections in A. Preventive Care:

- Exact number of appointments is not as important as principle (reactive vs. proactive discussion) – if answer using both number of appointments and description, score based on description.
- If only answer with number of appointments and include information about the type of appointment (illness, injury, etc.) to justify not discussing certain topics, mark as missing data point in score sheet.
- If answer fits equally between two scores, give higher of the two as long as it fits all criteria for that score. (i.e. do not take mean as you did for other questions).
  - E.g. always discuss nutrition and teeth brushing, never discuss any other components = score of 3 (talk about two components)
- If only routinely discuss with puppies/kittens, they cannot receive a score of 3 because this is not all patients. In these situations, think about the proportion of total patients that these animals fit into.

1. In your last five appointments, how often did you ask about:
   a) animal needs (e.g. exercise, space, nutrition, outdoor access, mental stimulation)**
   b) basic daily care**
** Questions 1 a and b together:

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Do not routinely discuss animal needs or basic daily care.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>• 0-2/ last 5 appointments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Acceptable</th>
<th>Reactive: when owner initiates discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>• passive discussion (not directly asked)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• if issue arises following physical examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3/last 5 appointments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Proactive: routinely initiate discussion of <strong>two or more</strong> components</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>• in depth discussion of one component</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 4-5/last 5 appointments</td>
</tr>
</tbody>
</table>

Animal needs includes:

- Exercise: frequency, duration, intensity
- Appropriate space: backyard, indoor space
- Nutrition: age/stage specific diets, frequency of feeding, amount
- Outdoor access: both dogs and cats
- Mental stimulation: enriching toys and activities
- Companionship: attention from owner

Basic daily care includes:

- Brushing
- Professional grooming
- Bathing
- Nail trims

c) companionship (e.g. human vs. non-human, type and number)

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Do not routinely discuss companionship.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>• 0-2/last 5 appointments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Acceptable</th>
<th>Reactive: when owner initiates discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td>• passive discussion (not directly asked)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3/last 5 appointments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Proactive: routinely initiate discussion of at least one component from key with most/all clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>• 4-5/last 5 appointments</td>
</tr>
</tbody>
</table>

Companionship includes:

- Other pets in household and how they get along together
- Children in household and how pet gets along with them
- Time spent home alone vs. with an owner home
### d) training and behaviour

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely discuss training and behaviour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 0-2/last 5 appointments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2 | Reactive: when owner initiates discussion  
|   | OR passive discussion (not directly asked)  
|   | OR if issue arises following physical examination,  
|   | behaviour in appointment  
|   | - 3/last 5 appointments |
| 3 | Proactive: routinely initiate discussion of at least one component from key with most/all clients  
|   | - 4-5/last 5 appointments |

Training and behaviour includes:
- Training process: progression, issues, attending classes, socialization, handling
- Behaviour issues: aggression, specific fears
- Behaviours indicative of pain, distress, normal play behaviour

### e) veterinary preventive care (e.g. vaccinations, diagnostic testing, dental care, parasitic control, transmissible or infectious disease)

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely discuss veterinary preventive care.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 0-2/last 5 appointments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2 | Reactive: when owner initiates discussion  
|   | OR passive discussion (not directly asked)  
|   | OR if issue arises following physical examination  
|   | - 3/last 5 appointments |
| 3 | Proactive: routinely initiate discussion of two or more components from key with most/all clients  
|   | OR in depth discussion of one component  
|   | - 4-5/last 5 appointments |

Veterinary preventive care includes:
- Vaccinations: schedules, core vs. optional vaccines
- Diagnostic testing: blood, urine, fecal testing; senior blood panel vs. wellness panel
- Dental care: teeth brushing, dental diets, dental cleanings
- Parasitic control: preventives for internal parasites (heartworms, hookworms, etc.), fleas and ticks
- Transmissible or infectious disease: modes of transmission, risk factors, health consequences (e.g. Lyme disease, rabies, leptospirosis, FIV/FeLV)
B. Quality of Life
2. In which situations, if any, and how would you discuss the following with owners? In your last five appointments, how often did you ask about:

a) Judging quality of life and signs of declining health, including realistic expectations for chronic disease (time, financial obligations, home care)

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Reactive: when issue has arisen and action should be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>If previous, ongoing health issue OR owner initiates discussion, suggests an issue</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Proactive: initiate discussion with every owner of a senior patient or patient diagnosed with chronic disease.</td>
</tr>
</tbody>
</table>

b) End of life, humane end points and euthanasia

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Reactive: when issue has arisen and action should be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>If previous, ongoing and serious health issue OR owner initiates discussion, suggests an issue</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Proactive: initiate discussion with owner of every seriously ill patient.</td>
</tr>
</tbody>
</table>

c) Animal behaviour: signs of pain, distress, normal play behaviour

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Reactive: when issue has arisen and action should be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>If previous, ongoing health issue OR owner initiates discussion, suggests an issue</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Proactive: initiate discussion with every owner regardless of wellness/illness status.</td>
</tr>
</tbody>
</table>

- Score based on where emphasis is placed if split between multiple categories
- If fulfill criteria for two categories, score higher of two (don’t take mean here).
### APPENDIX VIII

Scheme for scoring veterinary appointments for the discussion of topics related to animal welfare

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Part 1: Communication and/or discussion of:**

a. Basic daily care and animal needs (e.g. grooming, exercise, space req., age/stage spec. nutrition, enrichment, predictable routines)
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ____________________________
   - **Notes:** __________________________________

b. Companionship (e.g. approp. time to spend, type and number of companions)
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ________________
   - **Notes:** __________________________________

c. Basic animal behaviour: signs of pain, distress, play behaviour
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ____________________________
   - **Notes:** __________________________________

d. Potential behaviour issues (specific fears, aggression, etc.)
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ____________________________
   - **Notes:** __________________________________

e. Appropriate training, socialization, handling
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ____________________________
   - **Notes:** __________________________________

f. Veterinary preventive care (immunization, diagnostic testing, dental care, parasitic control, sterilization)
   - **Veterinarian (time: _____):** 1 2 3 4 5
   - **Initiated by owner (time: ________):** 1 2 3 4 5
   - **N/A (specify):** ____________________________
   - **Notes:** __________________________________
g. Transmissible, infectious diseases
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ________________________________
      Notes: ______________________________________

h. Judging quality-of-life and signs of declining health
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________

i. End of life issues, humane end points, euthanasia
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________

j. Chronic pain
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________

k. Alternatives to medically unnecessary procedures
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________

l. Availability of pre-purchase, pre-breeding counselling
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________

m. Appropriate sources of information for independent consultation
      Veterinarian (time: _______):  1  2  3  4  5
      Initiated by owner (time: _______):  1  2  3  4  5
      N/A (specify): ______________________________
      Notes: ______________________________________
APPENDIX IX

Scheme for scoring interview responses concerning pain assessment and management

General notes
- If you cannot tell score from answer (question not answered, response lacking detail or too vague), score as 0 – unclear
  - Only score as unclear if response does not answer question
  - Do not score as unclear if have uncertainty deciding between categories (e.g. 2 vs. 3): pick one, but note that you would alternatively put the other and why.
- Score each question according to answers given to that question ONLY – do not look to responses to other questions for additional information.
  - If interviewer mentions that question has been previously answered and does NOT ask question fully, score section where question had been answered.
  - If interviewee refers to response to other question as answer, score answer from that section.
- Justify score given for each question in the explanation/notes section of scoring sheet.
- If score could alternatively fall between two categories, choose one but make note of alternate score in scoring sheet.

Interview: pain assessment and management
A. Analgesic regimes

1. Postoperatively, how do you recognize pain in cats?

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insufficient</td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

+0.5 for use of standardized scoring system/pain assessment tool

- Both bolded items and examples listed after bolded items count as behavioural signs.
- Category titles do not count as behavioural signs as they are not specific enough.

Category 1: Non-specific behavioural signs
- **Head position**: lowered or hanging head
- **Tail movement**: flicking/swishing
- **Grooming**: excessive grooming or attention to particular areas (e.g. surgical site), lack of overall grooming
- **Reduced activity**
- **Loss of appetite**
- **Vocalization**: crying, growling, groaning, hissing
- **Restlessness**
- **Physiological parameters**: heart rate, respiration rate, body temperature
Category 2: Behavioural signs identified through distance monitoring

- **Body posture, position**: hunched, crouched and/or tense; sitting or laying in abnormal positions
- **Facial expression**: squinting and/or slanted eyes, tense cheek/chin, whiskers pulled back
- **Mobility/movement**: abnormal gait, weight shifting, reluctance to move
- **Hiding**

Category 3: Behavioural signs identified through interaction

- **Reactivity to touch and palpation**
- **Reactivity to people**: unresponsive, reduced interaction (vs. before surgery), aggressive interaction (when never was before)

2. *Postoperatively, how do you recognize pain in dogs?*

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Behavioural signs from category 1, or only others not listed.</td>
<td>At least one behavioural sign from category 2.</td>
<td>At least one behavioural sign from category 3.</td>
</tr>
</tbody>
</table>

+0.5 for use of standardized scoring system/pain assessment tool

- Both bolded items and examples listed after bolded items count as behavioural signs.
- Category titles do not count as behavioural signs as they are not specific enough.

Category 1: Non-specific behavioural signs

- **Facial expression**: furrowed brow
- **Grooming**: excessive grooming or attention to particular areas (e.g. surgical site), lack of overall grooming
- **Reduced appetite**
- **Vocalization**: crying, wimpering, groaning
- **Restlessness**
- **Physiological parameters**: heart rate, respiration rate, body temperature

Category 2: Behavioural signs identified through distance monitoring

- **Body posture, position**: hunched and/or tense; sitting or laying in abnormal positions
- **Mobility/movement**: lameness/limping, reluctance or refusal to move

Category 3: Behavioural signs identified through interaction

- **Reactivity to touch and palpation**
- **Reactivity to people**: reduced interaction (vs. before surgery), aggressive interaction (when never was before)

3. *How do you train staff (including volunteers) to recognize signs of pain?*

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No training for new staff members</td>
<td>Informal training for new staff members</td>
<td>Formal training for new staff members</td>
</tr>
</tbody>
</table>

- Training through formal education (e.g. veterinary school, vet tech degree, etc.) does not count as training for staff members.
Informal training (examples)
- Shadow existing staff for any period of time, with interaction (new employee follows existing employee)
- New staff told to refer to written SOPs (standard operating procedures): staff manual, staff binder, handouts, referral to posters showing signs of pain or pain scales
- Staff meetings

Formal training (examples)
- Protocols and procedures for new staff training with regards to pain management
- Use of existing training programs for pain recognition and management (e.g. “Pain Hurts” CD-ROM (Dr. Karol Mathews), online resources (e.g. http://www.animalpain.com.br/en-us/), workshops at meetings or conferences)
- Supervised training period for any period of time (existing employee supervises and follows new employee)
- Any pain-specific continuing education

4. *When planning for and about to perform surgical procedures,*
   
   a) *How do you develop a pain management plan for your patients?*

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No general or standard protocol followed.</td>
<td>Follow a general or standard protocol for the procedure.</td>
<td>Adapt general or standard protocol for the procedure to the individual patient and their needs.</td>
</tr>
</tbody>
</table>

   b) *How do you decide about providing analgesics for surgical patients?*

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely provide analgesics to all patients undergoing surgical procedures.</td>
<td>All patients undergoing any surgical procedure receive some form of analgesic.</td>
</tr>
</tbody>
</table>

   c) *Please describe the common points when you routinely provide analgesics.*

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely provide analgesics OR only provide analgesics after procedure</td>
<td>Before/during and after the procedure OR provide analgesics before/during procedure (if using long-action drugs)</td>
</tr>
</tbody>
</table>

   - Some analgesics provided before the procedure should last the duration of procedure, thus pain control during the procedure would not be needed.
   - If only provide analgesics during procedure, score as insufficient = 1.
   - Definition of after: immediately post-surgery, once animal wakes up
5. **What information are owners provided with at the time of post-surgical discharge?**
   
a) **How do you communicate post-surgical instructions to owners?** (e.g. written, verbal, both)

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Any form of written instructions only</td>
<td>Oral instructions only</td>
<td>Oral instructions AND any form of written instructions</td>
</tr>
</tbody>
</table>

+0.5: demonstration of procedures

b) **How do you train owners to recognize signs of pain?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not train owners</td>
<td>Oral instructions only OR any form of written instructions only</td>
<td>Oral instructions AND any form of written instructions</td>
</tr>
</tbody>
</table>

- For both 5a and 5b, if say they provide information, but do not specify the form, score as acceptable = 2.

6. **How would you know if a cat had chronic pain? What does a chronically painful cat look like?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No objective assessment, only assess using non-specific behavioural signs.</td>
<td>No objective assessment, (routinely) assess using any pain-specific behavioural signs.</td>
<td>Use of a chronic pain questionnaire, chronic pain scale, or other objective assessment tools.</td>
</tr>
</tbody>
</table>

- Both bolded items (below) and examples listed after bolded items count as behavioural signs.
- In order to be considered acceptable, must include at least one pain-specific behavioural sign (independently or in conjunction with non-specific signs).

**Pain-specific behavioural signs**

- **Mobility**: difficulty and hesitation in movement, stiffness and lack of fluidity, difficulty raising after resting, reluctance to jump up/down or use stairs, lameness
- **Reactivity to touch and palpation**
- **Avoiding interaction and attention from people, other pets**
- **Lack of comfort when resting, relaxing** (e.g. changing resting positions often)

**Non-specific behavioural signs**

- **Changes in eating/drinking**
- **Changes in grooming habits**
- **Changes in normal activities**: play, jump, hunt, use of litter box
- **General temperament/demeanor**: grumpy, quieter, hiding, withdrawal, increase in sleeping
7. How would you know if a dog had chronic pain? What does a chronically painful dog look like?

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>No objective assessment, only assess using non-specific behavioural signs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>No objective assessment, (routinely) assess using any pain-specific behavioural signs.</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Use of a chronic pain questionnaire, chronic pain scale, or other objective assessment tools.</td>
</tr>
</tbody>
</table>

- Both bolded items (below) and examples listed after bolded items count as behavioural signs.
- In order to be considered acceptable, must include at least one pain-specific behavioural sign (independently or in conjunction with non-specific signs).

Pain-specific behavioural signs
- **Mobility**: difficulty in movement (lying, sitting, jumping), difficulty lying and rising, lack of comfort when resting, restless, reluctance to walk/run/jump, low tolerance to exercise, stiffness, lameness
- **Change in normal interactions with humans and other animals: reluctance to play, touch sensitivity in certain body areas**

Non-specific behavioural signs
- **Changes in eating**
- **Vitality**: low energy (lethargic), low activity
- **General demeanour**: not alert, indifferent, anxious, agitated, detached, hiding, aggressive
- **Vocalization**: whining, crying, moaning, groaning

OVARIOHYSTERECTOMY (OVH)
*Pull records from the last 6 ovariohysterectomies, performed (ask staff to provide the following information to ensure client confidentiality):

**OVH a) Pre-surgical analgesia?; Post-surgical analgesia?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Do not routinely provide analgesics OR only provide analgesics during procedure OR only provide analgesics after procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Pre-surgical analgesia (with opioids)</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Pre-surgical analgesia (with opioids) AND post-surgical analgesia (with NSAID and/or opioid)</td>
</tr>
</tbody>
</table>

+0.5 if use local anaesthetics/line blocks
  - E.g. tetracaine, procaine, benzocaine, lidocaine, bupivacaine, ropivaccaine, mepivacaine, prilocaine

- Analgesics provided before procedure should last the duration of procedure, thus pain control during the procedure would not be needed.
- If do not specify drug names, score based on a yes/no basis.
- If list drugs that are not listed, please use a search engine to determine whether they are opioids or NSAIDS. If do not belong to either category, assume they are not useful for acute pain.
- **Opioids**
  - morphine, methadone, fentanyl, pethidine (meperidine), nalbuphine, buprenorphine (for cats only), nalmefene, naltrexone, hydromorphone,
- **Non-steroidal anti-inflammatory drugs [NSAIDs]**
  - indomethacin, carprofen, meloxicam (name brand: Metacam), tolfenamic acid, deracoxib, firocoxib, robenacoxib
- **Other drugs NOT useful for acute pain:**
  - ketamine, amantadine, gabapentin, imipramine, amitriptyline, duloxetine, prenoleucotropin
  - butorphanol
  - tramadol*
  - Alpha2 adrenoceptor agonists: xylazine, romifidine, medetomidine, dexmedetomidine

**OVH b) Analgesics provided to owner?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely provide analgesics to owners OR recommend analgesics to owners, but allow owners to decline</td>
<td>Analgesics provided to owners for less than 2 days post-spay for all cats, less than 4 days post-spay for all dogs.</td>
<td>Analgesics provided to owners for 2-3 days post-spay for all cats, 4-5 days post-spay for all dogs.</td>
</tr>
</tbody>
</table>

- If do not mention length of pain control, but acknowledge that they provide analgesics to owners, score as acceptable = 2.
- Score lower of two categories if criteria is met for dogs but not cats (and vice versa)

**OVH c) Follow-up?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do not routinely follow up after spays</td>
<td>Do not routinely initiate follow up, but tell clients that veterinarians are available for questions and concerns via telephone</td>
<td>Follow-up via telephone OR in-clinic re-check</td>
</tr>
</tbody>
</table>

**Note willingness to pull records, willingness to provide answer**
APPENDIX X

Scheme for scoring interview responses concerning behavioural health

General notes
- If cannot tell from answer (question not answered, response lacking detail or too vague), score as 0 – unclear
  - Only score as unclear if response does not answer question
  - Do not score as unclear if have uncertainty deciding between categories (e.g. 2 vs. 3): pick one, but note that you would alternatively put the other and why.
- Score each question according to answers given to that question ONLY – do not look to responses to other questions for additional information.
  - If interviewer mentions that question has been previously answered and does NOT ask question fully, score section where question had been answered.
  - If interviewee refers to response to other question as answer, score answer from that section.
- Justify score given for each question in the explanation/notes section of scoring sheet.
- If score could alternatively fall between two categories, choose one but make note of alternate score in scoring sheet.

A. Handling and Training Procedures
1. How do you recognize fear in cats?
2. How do you recognize fear in dogs?

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>• Less than two correct signs of fear in total.</th>
<th>• No obvious signs of fear.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Two (or more) correct signs of fear, including at least one obvious sign.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Three (or more) correct signs of fear, including at least one obvious AND one subtle sign.</td>
<td></td>
</tr>
</tbody>
</table>

Obvious signs
- **Body posture, position**: includes cowering and crouching, plus anything related to standing/sitting/laying positions, proximity to ground (vertical) or weight distribution/barring front to back (horizontal)
- **Ear, head position**: ear rotation (sideways, backwards) and perkiness (flattened), height at which head is held
- **Tail position/movement**: low or tucked tail
- **Hiding**
- **Avoiding physical contact**: implies maintenance of distance from human (e.g. staying in back of carrier) or movement that leads to increasing distance from human (e.g. running away). Also includes movement away from human after attempts to touch/pet animal.
- **Aggression**: attempted or successful swats, bites, scratches
- **Vocalization**: hissing, meowing, growling, moaning
- **Urination, defecation**
Subtle signs

- **Avoiding eye contact**: avoiding looking at human straight on
- **Backing away** implies movement away from staff, but at a smaller distance than for avoiding physical contact
  - a step or two back (backing away) vs. multiple steps, significant displacement (avoiding physical contact)
- **Freezing**: absence of movement
- **Shaking, trembling**
- **Pupil dilation**
- **Facial expression**: includes characteristics of facial expression itself (e.g. eyes, eye brows, mouth) and “facial expression” as response.
- **General demeanor**: nervous, jittery, ‘on edge’, reactive, etc.
- **Not taking treats** (or other food rewards)
- **Lip licking**
- **Panting (dogs)**
- **Yawning (dogs)**

**Scoring examples**

- Any number of only subtle signs (1, 2, 3+) = 1 (because does not include an obvious sign)
- 1 obvious + 1 subtle = 2 (2 correct signs in total, including 1 obvious sign)
- 2 obvious signs = 2 (2 signs in total, including the minimum of at least one obvious sign)
- 3 obvious signs = 2 (3 signs total BUT no subtle sign)
- 2 obvious and 1 subtle = 3 (3 signs in total, including one from each category)

3. **In the event that a fearful animal comes in for an appointment, what approaches do you typically consider within the exam room to minimize fear?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Only inappropriate approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>One appropriate/positive approach.</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>At least two appropriate/positive approaches.</td>
</tr>
</tbody>
</table>

- 0.5 if mention any inappropriate approaches within an otherwise acceptable or excellent response.
+ 0.5 if mention preventive measures

**Appropriate approaches**

- **Offer treats/food or other rewards** (e.g. toy, catnip)
- **Allow the animal time to acclimate to the room**: not rushing to examine or touch
- **Use non-threatening behaviour**: tone of voice, body posture (e.g. kneeling), avoiding direct eye contact, remove medical protective clothing that might have preexisting negative associations (e.g. lab coat, stethoscope)
- **Modify exam location and technique**: where animal most comfortable (e.g. in bottom of carrier, on floor, in owner’s arms/lap), use high traction surface under animal (e.g. mat), use towels/blankets
- **Use pheromones**: Feliway® or Adaptil® (DAP) diffusers and/or aerosols
- **Ask owner about animal’s response to handling**: collect information based on history and modify approach accordingly
- **Set up alerts in system**: note fearful behaviour in file and successful approaches for future appointments
- **Move animal into room rapidly** (decrease time spent in waiting area)
- **Greet animal in neutral space** (e.g. waiting area)

**Inappropriate approaches [-0.5 from acceptable or excellent]**
- Following/chasing animal around the room
- Moving quickly to complete appointment sooner
- Using heavy restraint to quickly complete procedures/exam
- Muzzling and other restraint devices (e.g. cat mask, cat bag) – not positive
- Using chemical restraint (sedation)

**Preventive measures [+0.5]**
- Encourage regular visits (not for veterinary care) to develop positive association
- Ensure positive visits from beginning as a puppy/kitten
- Working with animal over the years isn’t necessarily preventive by definition, but can be included it here because it is helping patient to develop positive association to clinic.

4. **How do you recognize a potentially aggressive cat?**

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th></th>
</tr>
</thead>
</table>
| 1 | Less than two correct signs of aggression in total.  
No obvious signs of fear. |
| 2 | Acceptable  | Two (or more) correct signs of aggression, including at least one obvious sign. |
| 3 | Excellent   | Three (of more) correct signs of aggression, including at least one obvious AND one subtle sign. |

**Obvious signs**
- Vocalization: hissing, spitting
- Swatting, lunging
- Any obvious signs of fear **ONLY if acknowledge that aggression is fear-based**

**Subtle signs**
- Tense facial expression: key component is tension/tightness/stiffness/frozen face
- Tense/tight/stiff body
- Piloerection: hair standing on end, animal may appear ‘puffy’, have their ‘hackles up’, or a ‘puffy tail’
- Any subtle signs of fear **ONLY if acknowledge that aggression is fear-based**
5. How do you recognize a potentially aggressive dog?

<table>
<thead>
<tr>
<th>1</th>
<th>Insufficient</th>
<th>• Less than two correct signs of aggression in total.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• No obvious signs of fear.</td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Two (or more) correct signs of aggression, including at least one obvious sign.</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Three (of more) correct signs of aggression, including at least one obvious AND one subtle sign.</td>
</tr>
</tbody>
</table>

Obvious signs
- Vocalization: growling, barking
- Baring teeth, lips retracted
- Snapping, lunging
- Any obvious signs of fear ONLY if acknowledge that aggression is fear-based

Subtle signs
- Tense facial expression
- Tense/tight body
- Direct eye contact: looking at staff member straight on, including staring and glaring, holding contact for extended period of time.
- Piloerection
- Any subtle signs of fear ONLY if acknowledge that aggression is fear-based

6. How do you examine an aggressive animal?

<table>
<thead>
<tr>
<th>1</th>
<th>Insufficient</th>
<th>Use physical force</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Approaches that protect human safety</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Approaches that protect human safety AND approaches that lead to long-term resolution</td>
</tr>
</tbody>
</table>

- If response includes aspects that fall into multiple categories, note this and take average of two scores, including full explanation on score sheet.
  E.g if scruff (1) and perform cursory exam (2), score = 1.5 (1+2/2)

Physical force
- Heavy restraint: includes degree, duration of restraint, plus increased number of staff members.
- Scruffing

Protect human safety
- Use of restraint devices: muzzles, masks, cat bags/nets
- Use of chemical restraint (i.e. sedatives)
- Use of personal protective wear: gloves
- Use towels and/or blankets
- Perform cursory exam: quick, not thorough
- Send animal home and have return at a later date (with or without chemical sedation)
Long-term resolutions
- Regular visits to develop positive association to veterinary clinic
- Proactive response: provide training advice or recommendation to seek advice and training from trainer.

7. Do you ever use treats or other forms of positive reinforcement with patients? If so, provide examples.

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Acceptable</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RARELY/NEVER: In general, do not routinely use treats and/or other forms of positive reinforcement with patients</td>
<td>SOMETIME: Only give treats to dogs and/or not every occasion with every patient</td>
<td>ALWAYS: Give or attempt to give treats and/or other forms of positive reinforcement (both dogs AND cats) whenever medically appropriate (e.g. not pre-surgical patients).</td>
</tr>
</tbody>
</table>

- If don’t specify cat OR dog, but use terms like ‘animals’, ‘patients’, ‘clients’, then assume give to both cats and dogs = can score as 3.
- If don’t mention cats but do mention dogs specifically, assume do not give treats to cats (note this in score sheet) = cannot score as 3
- Feliway® ≠ positive reinforcement

Positive reinforcement
- Treats or other food rewards (e.g. kibble)
- Petting, scratching, massaging (as long as animal finds this positive)
- Toys (balls, chews, bones), catnip

8. Specifically with reference to handling cats, do you typically:

a) Allow cat time to exit carrier on it’s own?

<table>
<thead>
<tr>
<th></th>
<th>RARELY/NEVER</th>
<th>SOMETIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rarely, in limited situations, when have no other choice.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ROUTEN/ALWAYS</td>
<td>Routinely, usually (e.g. opening carrier door once enter room)</td>
</tr>
</tbody>
</table>

b) Assist cat to exit carrier?

<table>
<thead>
<tr>
<th></th>
<th>OFTEN/ALWAYS</th>
<th>SOMETIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Routinely, usually (e.g. tipping carrier, reaching in to pull/drag cat out)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Routinely, usually (e.g. tipping carrier, reaching in to pull/drag cat out)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rarely, in limited situations, when have no other choice.</td>
<td></td>
</tr>
</tbody>
</table>

c) Take top off carrier?

<table>
<thead>
<tr>
<th></th>
<th>RARELY/NEVER</th>
<th>SOMETIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rarely, in limited situations</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ROUTEN/ALWAYS</td>
<td>Routinely, usually when carrier design allows.</td>
</tr>
</tbody>
</table>
d) Use towel wraps?

<table>
<thead>
<tr>
<th></th>
<th>RARELY/NEVER</th>
<th>Rarely, in limited situations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SOMETIMES</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>OFTEN/ALWAYS</td>
<td>Routinely, usually when needed to appropriately restrain</td>
</tr>
</tbody>
</table>

e) Use scruffing?

<table>
<thead>
<tr>
<th></th>
<th>OFTEN/ALWAYS</th>
<th>Routinely, usually</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SOMETIMES</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RARELY/NEVER</td>
<td>Rarely, as a last resort after unsuccessful attempts with other restraint techniques</td>
</tr>
</tbody>
</table>

f) Do you have any other handling or restraint techniques?

DO NOT SCORE [primarily to inform us of any other techniques]

General notes about cat handling questions:

- Try not to focus on the words routinely or rarely, but more so the context of when they use different techniques
- If make attempts to incorporate handling method into everyday practice operations (e.g. exams, removal from carrier, during vaccinations), typically attempt to use the technique, regardless of whether it’s successful (e.g. we try, but it doesn’t work) = YES
- If use as a last resort, when they have no other choice (e.g. they dump carrier if they don't come out on own after giving them a chance and the carrier doesn't come apart), never as a first method, only after attempts at other options have failed, in limited situations = NO

B. Advice and Assistance with Behaviour and Training

9. Do you feel confident in your ability to offer advice regarding behaviour and training?

10. Do you have an established relationship with a professional, certified animal behaviorist/trainer, which you refer clients to?

   a) What criteria, if any, do you have for trainers that you recommend?

Questions 9 & 10 together:

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Not confident, no established relationship with a behaviorist/trainer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Not confident but have an established relationship with a behaviorist/trainer OR No established relationship with behaviorist/trainer, but confident in ability to offer behaviour and training advice.</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Confident in ability to offer advice AND have an established relationship with behaviorist/trainer.</td>
</tr>
</tbody>
</table>

+- 0.5 for appropriate criteria for recommended trainers

- If hint at certain level of confidence for any level of advice (e.g. only for easy issues, but refer for more difficult cases such as aggression) = confident
- Relationship with trainer does not have to be formal: if veterinarian has referred to them in past or has ability to refer in future = relationship
Good criteria: +0.5
- Reward-based training/positive reinforcement (AVSAB)
- Works collaboratively with veterinarian (AVSAB)
- Appropriate certifications: CCPDT, CAPPDT, APDT *(make note of all other certifications mentioned on score sheet).*

Bad criteria: -0.5
- Punishment-based training: using choke/prong/shock collars (ACVB)
- Teaching dog to ‘submit’ using intimidation, threatening (ACVB)
- Uses dominance theory to explain problem behaviors, using alpha rolls/scruffing/helicoptering (ACVB)

11. Are there any training methods that you routinely recommend:
   a) For kittens?  b) For puppies?

12. Are there any training methods that you never recommend:
   a) For kittens?  b) For puppies?

Questions 11 & 12 together:

<table>
<thead>
<tr>
<th></th>
<th>Insufficient</th>
<th>Only inappropriate training methods mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Answer <strong>one</strong> question well: recommend appropriate methods <strong>OR</strong> never recommend inappropriate methods (e.g. punishment).</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Answer <strong>both</strong> questions well: recommend appropriate methods <strong>AND</strong> never recommend inappropriate methods.</td>
</tr>
</tbody>
</table>

-0.5 [for acceptable or excellent] if include that they recommend any inappropriate (negative) training methods, regardless of other methods answered

Appropriate recommended training methods
- Positive reinforcement/reward-based training (adding something animal considers desirable to increase desirable behaviour)
- Halter training, crate training, attachment training
- Appropriate discipline (e.g. ignoring bad behaviour to reduce it – negative punishment)
- Negative punishment (removing something animal considers desirable to decrease undesirable behaviour)

Inappropriate training methods (to be avoided, never recommended)
- Positive punishment (adding something animal considers unpleasant to decrease undesirable behaviour)
- Negative reinforcement (removing something animal considers unpleasant to increase desirable behaviour)
- Any training method that has potential for physical and/or mental harm
13. Do you provide information on prevention of behaviour problems to puppy/kitten owners to ensure problems are addressed early?
   a) If so, what specific issues do you cover?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insufficient</td>
<td>Do not provide information on prevention of behaviour problems OR provide information on one behaviour problem.</td>
</tr>
<tr>
<td>2</td>
<td>Acceptable</td>
<td>Provide information on two (or more) behaviour problems</td>
</tr>
<tr>
<td>3</td>
<td>Excellent</td>
<td>Provide information on three or more behaviour problems AND must include bolded behaviour problems from detailed key</td>
</tr>
</tbody>
</table>

- 0.5 if do not talk about behaviour problems for kittens
+ 0.5 if provide handouts to clients in addition to discussion
- 0.5 if only provide information in handout form

- Total number of behaviour problems to use for score is the sum of the number listed for kittens and puppies
- If mention they discuss some issues in kittens, but don’t specify which they are, count this as one behaviour problem.
  - If no mention of kittens at all, -0.5.
- Baseline is discussion. If provide handouts (e.g. kitten/puppy packs, LifeLearn handouts) AND discussion (“we talk”, “I tell them” etc.), add 0.5. If provide handouts without any hint of discussion, -0.5.
- Other behaviour problems not listed and have them still count as long as they make sense, so you don't have to be restricted to the list specifically.

**Puppies**
- **Socialization**: exposure to various people (e.g. children), situations (e.g. mock veterinary exams, touching various areas), environments, animals
- **House training**
  - Preventing aggression: biting, scratching
  - Separation anxiety
  - Adequate exercise
  - Jumping/barking
  - General obedience training (e.g. leash walking/pulling, basic training for commands)

**Kittens**
- **Socialization**
- Play aggression
- Scratching
- General aggression
- Litter box issues
- Travel carrier/crate training

** Additional items not included here can be considered if reasonable (make note of these additional items on score sheet)**
Scoring examples:

- 2 problems for kittens or 2 for puppies or 1 for kittens and 1 for puppies = score of 2 - sum of behavior problems is 2 for all cases.

- Mention three behavior problems for puppies: socialization, house training, something else = score of 3 -0.5 (nothing for kittens).

- Mention three behavior problems total: house training for puppies, obedience training for puppies, preventing play aggression in kittens = score of 2 (three problems total, but did not include bolded problems).

- Mention general obedience training for puppies = score of 1 (only discuss one behavior problem, but don’t subtract 0.5 for kittens because description for insufficient also includes no information provided).
APPENDIX XI

Scheme for scoring veterinary appointments for veterinary staff-patient interactions

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

FOR CATS ONLY
Describe removal from carrier, including who removed the cat:

__________________________________________________________

Part 2: Evidence that staff recognizes specific behaviours (e.g. fear) and responds accordingly:

a. Allows time to acclimate prior to physical interaction
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________

b. Use of calm, non-threatening approach
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________

c. Use of positive reinforcement techniques: food rewards/treats
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________

d. Asks client about animal’s response to handling before interacting
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________
   * Specify (e.g. where most comfortable, issues with touching certain areas of body, any previous issues at the clinic): ____________________________________________

  * Specify (e.g. where most comfortable, issues with touching certain areas of body, any previous issues at the clinic):

  (e) Performs exam where animal is most comfortable (e.g. on floor)
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________

f. Use of diverse handling techniques
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________
   * Specify (e.g. use of towel/blanket):

g. Use of physical restraint
   Time: ___________ 1 2 3 4 5 N/A (specify): ___________
   Notes: ___________________________
   * Specify (degree, duration, and manner):
   ☐ Include owner? Directions given: ____________________________
h. Use of sedatives/anxiolytics (only as needed)
   Time: ___________  1  2  3  4  5  N/A (specify): ___________
   Notes: ___________________________________________________
   * Specify circumstances: _______________________________________________________________________

i. Use of high(er) traction surface when examining animal (e.g. towel, blanket, mat)
   Time: ___________  1  2  3  4  5  N/A (specify): ___________
   Notes: ___________________________________________________