Factors influencing veterinarian referral to oncology specialists for treatment of dogs with lymphoma and osteosarcoma in Ontario, Canada

Debbie L. Stoewen, DVM, MSW, PhD; Jason B. Coe, DVM, PhD; Clare MacMartin, PhD; Elizabeth A. Stone, DVM, MS, MPP, DACVS; Catherine E. Dewey, DVM, PhD

Objectives—To elucidate factors influencing practitioner decisions to refer dogs with cancer to veterinary oncology specialists.

Design—Cross-sectional study.

Sample—2,724 Ontario primary care companion animal veterinarians.

Procedures—Practitioners were invited to participate in a survey involving clinical scenarios of canine cancer patients, offered online and in paper format from October 2010 through January 2011. Analyses identified factors associated with the decision to refer patients to veterinary oncology specialists.

Results—1,071 (39.3%) veterinarians responded, of which 603 (66.2%) recommended referral for dogs with multicentric lymphoma and appendicular osteosarcoma. Most (839/1,059 [84.3%]) practiced within a 2-hour drive of a specialty referral center, and most (981/1,047 [93.7%]) were completely confident in the oncology service. Few (230/1,056 [21.8%] to 349/1,056 [33.0%]) were experienced with use of chemotherapeutics, whereas more (627/1,051 [59.7%]) were experienced with amputation. Referral was associated with practitioner perception of patient health status (OR, 1.54; 95% CI, 1.15 to 2.07), the interaction between the client's bond with the dog and the client's financial status, practitioner experience with treating cancer (OR, 2.79; 95% CI, 1.63 to 4.77), how worthwhile practitioners considered treatment to be (OR, 1.66 to 3.09; 95% CI, 1.08 to 4.72), and confidence in the referral center (OR, 2.20; 95% CI, 1.11 to 4.34).

Conclusions and Clinical Relevance—Several factors influenced practitioner decisions to refer dogs with lymphoma or osteosarcoma for specialty care. Understanding factors that influence these decisions may enable practitioners to appraise their referral decisions and ensure they act in the best interests of patients, clients, and the veterinary profession. (J Am Vet Med Assoc 2013;243:1415–1425)

As a society, our relationship with animals has evolved such that companion animals are now commonly valued as members of the family.1–3 The resultant demands of pet owners for improvements in veterinary health care over the past 30 years have challenged the veterinary profession to provide more sophisticated medical services.4–5 In response to increasing owner expectations6 and decreasing constraint on pet-related expenditures,7 the veterinary profession has expanded into specific fields of practice such as surgery, cardiology, neurology, and oncology, among others;8 for the purpose of providing specialized, state-of-the-art care. With the advent and proliferation of readily accessible emergency clinics and specialty hospitals, in addition to the traditional services of tertiary referral centers such as university teaching hospitals, the delivery of high-quality veterinary care has clearly become a multiliterary system not unlike the human health-care system. The provision of the best possible medical care to veterinary patients may be envisioned as a collegial partnership between general practitioners and board-certified specialists,8 with specialty care as a direct extension of primary care service.4

One established area of specialty veterinary service is oncology, particularly the subspecialty of cancer care for dogs. Cancer is the leading cause of death in adult dogs.9 Half of all dogs develop some type of cancer in their lifetimes, and cancer is the cause of death in 1 in 4 dogs.10–14 Moreover, the prevalence of cancer appears to be increasing and is expected to continue to do so as improvements in health care extend life expectancies.15 Despite these stark statistics, cancer has become a more treatable disease than ever before as a result of advancements in diagnostic testing, patient monitoring, and treatment as well as the availability of generic chemotherapeutics.16,17 Previously untreatable cancers are...
now addressed with contemporary treatment protocols, which have become more affordable than before. With the convergence of these developments, the treatment of cancer in companion animals may be on the verge of major change. More pets than ever may be in position to receive and benefit from treatment, which will shift the paradigm of cancer care in veterinary medicine and drive the coordination of service between primary care and specialty practices.

As is conventional within multitiered systems of health care, the intermediary between a client and specialty service is the primary care practitioner. Primary care practitioners make diagnoses, but they also provide guidance, advice, support, and counsel for care. The health, happiness, and QOL of patients and clients are markedly influenced by the choices made, so the recommendations of practitioners are of profound consequence. In cancer care, a major consideration is whether to recommend referral to a specialty service.

The process of referral has been investigated in human medicine since the 1960s. Research has focused on understanding and explaining the variation in referral rates among physicians as well as the impact of this variation on quality of patient care. Decisions to refer can be made on the basis of patient, physician, and practice characteristics as well as access to specialist care. Although findings differ, patient factors involved in referral decisions include age, sex, socioeconomic status, type of diagnosis, severity of illness, and demand for a referral. Physician factors include age, number of years in practice, style of practice, certainty of diagnosis, tolerance of uncertainty, workload, relationship with the specialist, and satisfaction with the specialty service. Practice factors include practice size, sophistication of technological equipment, and illness burden of the patient population. The availability of specialists and the distance from the specialty center have also influenced physicians' decisions to refer.

Patterns of under-referral, with implications for less-than-optimal quality of patient care, and over-referral, with implications for unnecessary investigations and procedures and the improper use of finite resources, have been a source of concern for health-care systems. Although the literature provides an introductory understanding of the variation that exists among practices and the factors that may be associated with the propensity to refer, the referral process in veterinary medicine has not been scientifically investigated to our knowledge. The implications of referral decision making may have similar relevance within veterinary health-care systems.

One means to gain insight into the decision-making process is the use of vignette-based inquiry (a research method that incorporates short stories or clinical scenarios), which, to the authors' knowledge, has not been reported in veterinary medicine. Vignette-based inquiry makes use of simulations of realistic clinical encounters "to elicit subjects' knowledge, attitudes, and/or opinions according to how they state they would behave in the hypothetical situation depicted." Vignette-based inquiry has been widely used in human medicine to evaluate the process of providing care, including factors that influence physicians' evaluations of patients' formulation of diagnoses and selection of treatments. A recognized and validated method of assessing clinical decision making and quality within health care. The purpose of the study reported here was to elucidate factors involved in the decision of veterinarians to refer canine patients to veterinary oncology specialists by use of vignette-based inquiry.

**Materials and Methods**

**Questionnaire development**—A review of the veterinary literature on case histories of cancer in dogs was performed. On the basis of those findings, a preliminary questionnaire was developed in accordance with vignette-based survey structure typical of research in the medical and social sciences. Two semistructured group interviews, one with 5 participants from Guelph, Ontario, and the other with 3 participants from Sudbury, Ontario, were conducted for investigators to become familiar with veterinarians' experiences with and perspectives on cancer and cancer treatment options and to perform a trial of the preliminary questionnaire. A $50 honorarium was provided to each participant at the end of each group discussion. On the basis of the opinions and feedback provided, the questionnaire was further refined and then pretested with 9 graduate students from the Department of Population Medicine at the Ontario Veterinary College.

The question content (range and appropriateness of the questions asked) and question construct (misspellings, clarity, and order) were assessed. In addition, expert opinion on the questionnaire was obtained from 2 self-selected members of the Ontario Veterinary College oncology service. An online version of the questionnaire was then developed and pretested with 5 randomly selected companion animal veterinarians who practiced within a 50-km (31.25-mile) radius of Guelph as listed in the publicly accessible database of the College of Veterinarians of Ontario. Names were on tickets drawn from a bag. Final modifications were made to the questionnaire to integrate feedback from the online pretest. The final version of the questionnaire was made available online and in paper format.

**Questionnaire design**—The questionnaire was organized into 3 sections. Section 1 consisted of a series of closed-ended questions regarding respondent demographics. Section 2 centered on 1 of 32 variations of a vignette built around 5 main dichotomous variables: dog's age (young or old), dog's overall health status (otherwise healthy or comorbidly diseased), type of cancer (lymphoma or osteosarcoma), strength of the owner-dog bond (strong or weak), and client's financial status (secure or restricted). The 32 vignettes represented all combinations of the 5 variables and thus a diverse pool of clinical scenarios. They contained realistic clinical detail to portray an actual clinical encounter and were framed in the first person to capture respondents' personal perspectives. Respondents were invited to assume the role of the practitioner within the case scenario and to rank their preference of treatment recommendation (referral, in-clinic treatment, palliative care, or euthanasia) from 1 (first choice) to 4 (last choice) given the specifics within the scenario. They
were then asked to rank, on a Likert scale of 1 (not important) to 5 (extremely important), 11 patient-, client-, and self-as-practitioner-related factors that might have influenced their first choice of treatment recommendation (patient age, sex, and overall health status; client's bond with the dog, client's financial status, and distance from the referral center; practitioner confidence in the referral center, experience with chemotherapy, and experience with surgical treatment of cancer; and practitioner perceptions of the potential to maintain QOL and to extend life expectancy and costs that would be incurred by clients in terms of time, effort, and money). Section 3 consisted of a series of closed-ended and ranking questions regarding the respondent's professional and personal experiences with cancer. Professional-related questions centered on experience with the diagnosis and treatment of dogs with multicentric lymphoma (a cancer usually treated via chemotherapeutics) and appendicular osteosarcoma (a cancer usually treated via surgery), how worthwhile they believed the treatment of these cancers to be, and more broadly, how worthwhile they believed the treatment of cancer was, compared with the treatment of a number of other chronic diseases in dogs, including diabetes mellitus, hyperadrenocorticism, chronic renal disease, congestive heart failure, and idiopathic epilepsy. Personal-related questions focused on respondents' experiences of cancer with their own dogs, other pets in their lifetime, themselves, close family members, and close friends. Overall, there were 32 versions of the questionnaire that differed only with regard to the vignette in section 2; sections 1 and 3 were the same in all versions.

**Study respondents**—Veterinary practitioners across the province of Ontario involved in companion animal practice to any degree, as indicated in the publicly accessible database of the College of Veterinarians of Ontario, were invited to participate in the study, excluding veterinarians involved in the initial group interviews and questionnaire pretests, veterinarians employed in a field other than primary care practice (eg, specialty or referral practice, industry, academia, or government), and veterinarians retired from practice. Computer-generated randomization assigned 1 of the 32 versions of the questionnaire to each practitioner. An initial letter of introduction was mailed to each practitioner describing the study and providing a link to the online questionnaire. This letter was followed 3 weeks later by a postcard reminder. A paper copy of the questionnaire and postage-paid return envelope were mailed 3 weeks after that, which was followed 5 weeks later by a final postcard reminder (ie, 11 weeks after the initial invitation was mailed). Concurrent with the primary recruitment process, the University of Guelph Alumni Affairs and Development office forwarded 2 email announcements of the study to all Ontario-based alumni of the Ontario Veterinary College (the first coinciding with the initial letter of introduction mailing and the second coinciding with the paper questionnaire mailing) using the databank of alumni residing in Ontario. In addition, the Ontario Veterinary Medical Association was enlisted to forward 5 announcements of the study to their membership via their electronic newsletter *Newshound*, with each announcement coinciding with a mailing plus a final-call announcement.

The questionnaire response period was from October 15, 2010, through January 31, 2011. Incentives for participation included $10.00 coffee gift cards for the first 100 respondents and a drawing for 1 of 3 complimentary passes to the joint American Animal Hospital Association and Ontario Veterinary Medical Association Conference held in March 2011 in Toronto. The study protocol was reviewed by the University of Guelph Research Ethics Board.

**Statistical analysis**—Distributions of questionnaire data by type of medicine practiced were compared among groups by means of the χ² test, as were associations between demographic variables and attitudes toward the treatment of cancer. Demographic variables (gender, type of medicine practiced, and geographic region) were compared between respondents and nonrespondents. Descriptive statistics (absolute and percentage frequencies, means, medians, SDs, and ranges) were calculated. Rankings of the relative importance of factors influencing practitioners’ recommendation for the first choice of treatment were summed.

Multivariate logistic regression was conducted to determine the practitioner-, client-, and patient-related factors contributing to practitioner preference to recommend referral to a specialty oncology service. Categorical variables evaluated included 23 practitioner and practice demographic variables, 10 practitioner attitudinal variables, and 5 vignette-based variables (3 patient related and 2 client related). Also included was 1 practitioner-related continuous variable (number of years in practice). Linearity of the continuous variable was assessed by including a quadratic term in the model and by categorization. Univariate analyses of the association of all potential variables with the outcome of referral were performed to select those with a value of P < 0.20 for entry into a model. Spearman rank correlations were calculated for categorical variables. For those variables identified as correlated (r ≥ 0.300 with evidence of multicollinearity), the variable with the greatest significance or degree of importance as a predictor was retained or index variables were created, as appropriate.

Forward-selection and backward-elimination modeling was performed to compare and validate the outcomes of each modeling process. Confounding was deemed to exist when the removal or addition of a variable resulted in a > 30% change in coefficients or changes in the direction of coefficients. Biologically and socially plausible interaction terms were identified. Models were compared via Akaike information criterion and Bayesian information criterion values and classification tables. With the purpose of identifying the factors associated with the choice of making a referral, the model containing the most variables was chosen as the final model. The χ² test was performed to explain the association between variables that formed single-order interaction terms. Analyses were performed with standard statistical software. Values of P < 0.05 were considered significant for all analyses.

**Results**

**Respondents**—Of 2,811 veterinarians registered in the province of Ontario, 2,724 (96.9%) were eligible to participate. Of those eligible, 1,071 responded, which
yielded an overall response rate of 39.3%. Of the 32 questionnaire versions differing only by vignette, the mean response rate per version was 33.5% (median, 35%; range, 22% to 42%). No significant difference was evident in the type of medicine practiced (100% companion animal or < 100% companion animal) for each of the 32 versions.

Response rates for eligible veterinarians by type of medicine practiced were as follows: 938 (2,258 (41.5%) veterinarians practiced 100% companion animal medicine, 82 of 283 (29.0%) practiced > 50% companion animal medicine, 32 of 93 (34.4%) practiced a mixture (50:50) of companion animal and large animal medicine, and 19 of 90 (21.1%) practiced < 50% companion animal medicine, with a summary overall response rate of 133 of 466 (28.5%) for those that practiced < 100% companion animal medicine. The participation rate varied by decade of graduation: 386 of 1,071 (36.0%) respondents graduated between 2000 and 2010, and only 24 (2.2%) graduated before 1970. Most (767/1,071 [71.6%]) completed the questionnaire online. Veterinarians who were female, practiced 100% companion animal medicine, or resided in central, southwestern, or eastern Ontario were significantly more likely to participate than were veterinarians who were male, practiced < 100% companion animal medicine, or resided in other parts of Ontario (Table 1).

Demographics—Of the 1,071 respondents, 871 (81.3%) graduated from the Ontario Veterinary College, 45 (4.2%) from the Atlantic Veterinary College, 19 (1.8%) from the Western College of Veterinary Medicine, 13 (1.2%) from the Université de Montréal Faculty of Veterinary Medicine, 19 (1.8%) from a US veterinary college, and 103 (9.6%) from other international schools of veterinary medicine. Three hundred eighty-six (36.0%) graduated between 2000 and 2010, 288 (26.9%) between 1990 and 1999, 261 (24.4%) between 1980 and 1989, 112 (10.5%) between 1970 and 1979, and 24 (2.2%) between 1955 and 1969. The median number of years in practice was 14.0 (range, < 1 to 50). Most (1,033/1,068 [96.7%]) were actively practicing; of the 1,071 respondents, 938 (87.6%) practiced in 100% companion animal practice, 82 (7.7%) in > 50% companion animal practice, 32 (3.0%) in 50% companion animal practice, and 19 (1.8%) in < 50% companion animal practice.

Employment designations were as follows: associates, 492 of 1,060 (46.4%); owners or partners, 443 (41.8%); locums, 101 (9.5%); and emergency clinicians, 24 (2.3%). Most (528/1,062 [49.7%]) respondents worked 20 to < 40 h/wk, whereas 413 (38.9%) worked 40 to < 60 h/wk, 81 (7.6%) worked 20 to < 20 h/wk, and 40 (3.8%) worked ≥ 60 h/wk. There was variation in the typical amount of time spent in appointments, with 500 of 1,067 (46.9%) respondents spending 0 to < 20 minutes, 499 (46.8%) spending 20 to < 30 minutes, and 68 (6.4%) spending ≥ 30 minutes. The distribution of respondents across communities was fairly equal, with 366 of 1,066 (34.3%) serving towns or villages, 317 (29.7%) serving suburban centers, 294 (27.6%) serving urban centers, and 89 (8.3%) serving rural regions. Most (553/1,059 [52.2%]) worked < 1 hour’s drive from the nearest veterinary referral center, and 340 (32.1%) worked 1 to < 2 hours’ drive, 117 (11.0%) worked 2 to < 4 hours’ drive, and 49 (4.6%) worked ≥ 4 hours’ drive from the nearest referral center.

The time invested in CPD in companion animal medicine per year differed, with 61 of 1,061 (5.7%) reporting 1 to < 25 hours, 267 (25.2%) reporting 25 to < 50 hours, 513 (48.4%) reporting 50 to < 100 hours, 172 (16.2%) reporting 100 to < 200 hours, and 48 (4.5%) reporting ≥ 200 hours.

Seven hundred ninety-six of 1,063 (74.9%) respondents reported dog ownership. Of 267 who did not own a dog at the time they answered the questionnaire, 81 (30.3%) had owned a dog ≤ 5 years ago, 43 (16.1%) had owned a dog within the preceding 5 to 10 years, 73 (27.3%) had owned a dog ≥ 10 years previously, and 64 (24.0%) had never owned a dog.

Primary care oncology practice in Ontario—The self-reported prevalence for the diagnosis of multicentric lymphoma and appendicular osteosarcoma in dogs dif-
ferred. For lymphoma, 547 of 1,030 (53.1%) respondents estimated they diagnosed it 1 to 2 times/y; 414 (40.2%) estimated they diagnosed it 3 to 6 times/y; and 69 (6.7%) estimated they diagnosed it ≥7 times/y. For osteosarcoma, 735 of 1,025 (71.7%) respondents estimated they diagnosed it 1 to 2 times/y; 257 (25.1%) estimated they diagnosed it 3 to 6 times/y; and 33 (3.2%) estimated they diagnosed it ≥7 times/y. With respect to the treatment of cancer in dogs, 349 of 1,056 (33.0%) respondents reported familiarity and comfort with oral administration of various chemotherapeutic drugs, whereas 230 (21.8%) reported familiarity and comfort with parental administration. Drugs administered orally included chlorambucil, cyclophosphamide, lomustine, melphalan, and methotrexate. Drugs administered parenterally included actinomycin D, carboplatin, cyclophosphamide, cytosine arabinoside, doxorubicin, gemcitabine, L-asparaginase, melphalan, methotrexate, mitoxantrone, vincristine, and vinblastine.

Types of cancers treated with orally or parenterally administered drugs included multicentric lymphoma (314/1,071 [29.3%]); gastrointestinal, mediastinal, or extrapoladonal lymphoma (169/1,071 [15.8%]); grade II or III mast cell tumor (189/1,071 [17.6%]); bladder or urethral transitional cell carcinoma (186/1,071 [17.4%]); appendicular osteosarcoma (86/1,071 [8.0%]); and splenic hemangiosarcoma (74/1,071 [6.9%]). Familiarity and comfort with surgical amputation was reported by 627 of 1,051 (59.7%) veterinarians. The degree of confidence in referral services that provide cancer care was high, with 981 of 1,047 (93.7%) respondents more than moderately confident to completely confident in the service, and only 66 (6.3%) not at all confident to moderately confident in the service.

Attitudes toward cancer treatment—Respondent attitudes toward cancer treatment differed, with 497 of 995 (49.9%) veterinarians indicating treatment of lymphoma as more than moderately to completely worthwhile to treat, 412 (41.4%) as moderately worthwhile to treat, and 86 (8.6%) as not at all to less than moderately worthwhile to treat. In contrast, 280 of 1,034 (27.1%) respondents considered the treatment of osteosarcoma as more than moderately to completely worthwhile to treat, 474 (45.8%) as moderately worthwhile to treat, and 280 (27.1%) as not at all to less than moderately worthwhile to treat. Five hundred forty-two of 1,051 (50.7%) practitioners reported treatment of cancer as just as worthwhile as the treatment of other chronic diseases (specifically diabetes mellitus, hyperadrenocorticism, chronic renal disease, congestive heart failure, and idiopathic epilepsy), whereas 371 (37.3%) viewed it as less worthwhile. In relation to experiences with cancer, 603 of 1,071 (56.3%) respondents reported treatment of cancer as just as worthwhile as the treatment of other chronic diseases, 269 (26.1%) as less worthwhile to treat, and 123 (11.9%) as more worthwhile to treat. Substantiating this shift, 668 of 990 (67.5%) viewed the treatment of cancer as more expensive than the treatment of other chronic diseases, 280 (28.3%) as expensive to a comparable degree, and 42 (4.2%) as less expensive.

Eleven demographic factors were independently associated with how worthwhile the treatment of cancer was ranked. Practitioners were significantly more likely to think of the treatment of cancer as completely worthwhile when they were graduates in the 1990s and 2000s versus the 1980s and earlier (P < 0.001); were graduates of the Ontario Veterinary College or other North American colleges versus international veterinary schools (P = 0.023); practiced 100% companion animal medicine versus < 100% companion animal medicine (P < 0.001); worked at a 100% companion animal practice versus a < 100% companion animal practice (P = 0.005); were an associate or locum practitioner versus an owner or partner or an emergency practitioner (P = 0.015); spent ≥ 20 min/appointment versus < 20 min/appointment (P < 0.001); served urban centers and suburban communities versus town, village, or rural communities (P = 0.002); worked in the Greater Toronto Area or central Ontario versus southwestern, eastern, or northern Ontario (P = 0.002); practiced < 1 hour's drive versus > 1 hour's drive from a veterinary referral center (P = 0.009); were completely confident in the referral center versus moderately confident in the referral center (P < 0.001); and engaged in ≥ 50 hours of CPD/y versus < 50 hours of CPD/y (P = 0.001).
highly ranked factors, again on a Likert scale of 1 to 5, were perception of the potential to extend life (4.00), the strength of the human-animal bond (3.98), and the patient’s overall health status (3.93).

Factors associated with the recommendation of referral to a specialty oncology service—Several practitioner-, client-, and patient-related factors were associated with a recommendation to refer (Table 2). Regarding the interaction identified in the model between practitioner gender and the type of medicine practiced, females who practiced < 100% companion animal medicine were significantly less likely to recommend referral, compared with males and females who practiced 100% companion animal medicine and males who practiced < 100% companion animal medicine. When the analysis was limited to those who practiced < 100% companion animal medicine, \( \chi^2 \) testing revealed no significant association between practitioner gender and the following variables: worthwhileness of the treatment of cancer (n = 114), worthwhileness of the treatment of cancer versus other chronic diseases (122), expensiveness of the treatment of cancer versus other chronic diseases (121), and whether they treated cancer (133). Regarding the interaction identified between the perceived strength of the client’s bond with the dog and the client’s financial status, practitioners were most likely to recommend referral when clients were perceived to have a strong bond with the dog and to be financially secure.

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
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<td>Experience with treating cancer</td>
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</tr>
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<td>Do not treat lymphoma or osteosarcoma</td>
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<td>1.63–4.77</td>
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<td>Treat either</td>
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<td>0.81–2.81</td>
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<td>Weak</td>
<td>1.00</td>
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<td>Interaction between client-dog bond and client financial status</td>
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<td>Strong bond, secure vs restricted finances</td>
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<td>Otherwise healthy</td>
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<td>Male</td>
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<tr>
<td>100% companion animal</td>
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<td>&lt; 100% companion animal</td>
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<td>Referent</td>
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<td>1.07–6.26</td>
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<tr>
<td>Female, 100% companion animal vs &lt; 100% companion animal</td>
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<td>1.19–4.04</td>
<td>0.011</td>
</tr>
<tr>
<td>Male, &lt; 100% companion animal vs 100% companion animal</td>
<td>1.28</td>
<td>0.63–2.62</td>
<td>0.500</td>
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<td>Worthwhileness to treat cancer</td>
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<td></td>
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<tr>
<td>Completely worthwhile to treat</td>
<td>3.09*</td>
<td>2.03–4.72</td>
<td>&lt; 0.001</td>
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<td>Greater than moderately worthwhile to treat</td>
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<td>1.20–2.66</td>
<td>0.004</td>
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<td>Moderately worthwhile to treat</td>
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<td>Referent</td>
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<tr>
<td>More worthwhile to treat</td>
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<td>1.08–3.40</td>
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*Value is significantly (P < 0.05) different from 1. — = Not applicable. CI = Confidence interval.
Discussion

Understanding the process of health-care service (ie, what is done and with whom, when, where, how, and why) is fundamental to best practice. The veterinary profession has the responsibility to be aware of current and emerging trends in service, which enables it to assess and define itself and what it does, what it stands for, and equally important, where it is going and why. Likewise, veterinary practitioners have the responsibility to provide service through the lens of self-awareness given that health-care guidance and recommendations with implications for better or worse patient outcomes are provided each day. The results of the present study broaden the understanding of veterinary health-care service, specifically in the field of oncology, establishing a foundational understanding of the referral process to veterinary oncology specialists in Ontario, Canada.

As with all questionnaire-based studies, achieving an adequate response rate is important. This is of particular concern with the vignette-based mode of inquiry, which requires an adequate response rate for each vignette because each vignette represents a unique combination of factors and may represent different versions of the questionnaire (for the present study, each version of the questionnaire involved a unique vignette). This was achieved with a mean of 33.5 responses/questionnaire. The overall response rate of 39.3% is comparable with that in other recent questionnaire/response/questionnaire. The overall response rate of 39.3% is comparable with that in other recent questionnaire studies in oncology practice in veterinary medicine, albeit we expended substantially greater efforts for recruitment. Although significant (P < 0.001) differences existed in the distributional responses by gender, type of medicine practiced, and geographic region between respondents and nonrespondents, the proportional differences were small enough to suggest adequate representation and limited response bias.

Several key findings about the oncology referral process were identified. When presented with a hypothetical yet true-to-life vignette of a dog with newly diagnosed cancer and asked to choose the option of care they would most likely recommend, just over half (56.3%) of the responding primary care practitioners chose referral, whereas the balance chose palliative care (27.7%), in-clinic treatment (12.9%), and euthanasia (3.1%). Such a distribution, with most practitioners opting for referral (which offers high-tech, cancer-targeted intervention) or palliative care (which offers conservative support based on clinical signs), may have been driven by the fact that many practitioners lacked experience with chemotherapeutics and surgical intervention. Only 33.0% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 33.0% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of chemotherapeutics and surgical intervention. Only 21.8% of respondents were familiar and comfortable with oral administration of ch

Interestingly, the practitioners’ self-reported use of chemotherapeutic agents in the present study appears to be quite different from that of UK practitioners. In a recent survey of veterinary practitioners across the United Kingdom regarding cytotoxic drug use, with a response rate (39.3%) comparable with that in the present study, cancer chemotherapy was offered in 70.8% of UK practices. This difference could stem from several factors, including differences in societal attitudes toward the treatment of cancer in pets; the extent to which pets are medically insured; veterinary school curricula and CPD opportunities; practitioners’ perception of the mutagenic, carcinogenic, and teratogenic risks associated with handling chemotherapeutics; caseload (the number of cancer patients encountered); and the availability of specialty referral services. The difference gives rise to important questions, such as why more Ontario practitioners are not providing chemotherapy and what are the implications for patients with cancer and their families. A cross-cultural research approach could be highly informative in answering these questions as well as deepening understanding of the referral process.

Certainly, practitioner experience with cancer treatment influenced the approach to care in the present study. Respondents who did not treat cancer were 2.8 times as likely to refer to a specialty center as respondents who did treat cancer. This finding suggests that practitioners may be accommodating their lack of experience by drawing on the resources of board-certified specialists who are specifically trained to manage oncology care, thus optimizing the opportunity for high-quality care and good patient outcomes and judiciously limiting professional liability.

Practitioner attitudes toward treatment also influenced whether primary care veterinarians recommended referral to a specialty center. Respondents were 3.1 times as likely to recommend referral when they believed the treatment of cancer was completely worthwhile to treat versus when they believed it was only moderately worthwhile to treat. Substantiating this, respondents were nearly twice as likely to refer when they believed the treatment of cancer was more worthwhile (rather than less worthwhile) than the treatment of other chronic diseases. These findings suggest that practitioner attitudes toward the treatment of cancer could be a strong determinant of whether a referral may be made and that less favorable attitudes could pose a barrier to patients and their families accessing specialty oncology care.

Practitioner attitudes differed in relation to several factors, including school of graduation, era of graduation, and type of medicine practiced. Compared with the graduates of North American veterinary schools, graduates of international schools held less favorable views of the treatment of cancer. Similarly, those in practice since the 1980s and earlier and who practiced < 100% companion animal medicine also held less favorable views. Such predispositions may reflect variation in awareness of the treatment protocols available and outcomes attainable. Certainly, the positive association identified between the number of hours of CPD and practitioner opinion of the worthwhileness of treating cancer supports this possibility. If differences in attitudes do, in fact, relate to differences in proficiencies, which together translate to differences in standard of care for osteosarcoma.
patient care recommended, then the need for and value of CPD in the area of veterinary cancer treatment becomes clear. An increase in options for and practitioner engagement with CPD may enhance practitioner awareness of the possibilities attainable with specialty oncology care, thereby equalizing the opportunities for canine patients with cancer and the owners (and their families) of those patients.

Although the propensity to recommend a referral did not differ significantly on the basis of type of cancer, responses’ attitudes toward the treatment of lymphoma and osteosarcoma appeared to differ, with treatment of osteosarcoma viewed less favorably. Although attitudes toward the treatment of osteosarcoma have become more positive over time, some practitioners may still consider amputation to be disfiguring or a cause of pain or disability, which detracts from QOL, despite amputation providing the best pain control and preventing the possibility of an acute pathological fracture, both of which contribute to QOL. Attitudinal differences may also be related to differences between the long-term prognoses for these cancers, although with treatment, the median survival time for dogs with osteosarcoma currently ranges from 235 to 540 days. This is compared with the median survival time of 171 to 396 days (with a 25% 2-year survival rate) for dogs with lymphoma, along with the option of reinduction and rescue protocols that may further extend survival time. It is important that practitioners be aware of the biases they may harbor in relation to different types of cancer and the reasons for those biases as well as reflect on the validity of their opinions in light of changing standards of care, options for treatment, and outcomes attainable. The lack of a significant difference in propensity to refer suggests a willingness of primary care practitioners to offer the highest quality of care to canine patients despite differences in attitudes toward these cancers.

The propensity to refer was also associated with practitioner confidence in the specialty referral service. Respondents were 2.2 times as likely to refer when they were completely confident in that service as when they were only moderately confident. When practitioners have a strong sense of responsibility toward patients and clients, the ability to relinquish care and entrust patient and client welfare to an alternate service may be based in great part on the confidence in that service. With the finding of confidence as a significant determinant of whether a practitioner would recommend referral, it becomes important for referral services to consider the factors that might contribute to practitioner confidence and then design and deliver services in a manner that builds and maintains confidence. Theoretically, aspects of service that may contribute to practitioner confidence include attracting and retaining highly regarded specialists, offering an online cancer treatment consultation service, offering team-based educational programs for primary care practitioners and staff, developing and maintaining reliable communication practices and procedures with primary care veterinarians, and ensuring positive client experiences with optimal patient outcomes. The reputation of a referral center as well as the judicious promotion of a center’s technological, medical, and surgical proficiencies may also contribute to practitioner confidence. The finding of confidence as an important determinant of whether a practitioner would recommend referral suggests the need for additional research in this area. Understanding the factors that build and maintain confidence can be used to build and maintain the many bridges necessary between primary and specialty care to optimize patient and client care and the potential for best outcomes.

When other factors were not controlled for, the gender difference in the propensity to refer (females who practiced < 100% companion animal medicine were less than half as likely to refer as males who practiced < 100% companion animal medicine) was not related to whether they treated cancer, how worthwhile they believed the treatment of cancer was, or how expensive they believed it was. Although the reason for this difference remains unclear, it could have been related to the ways in which practitioners conceptualize dogs and their owners, which strongly influences the way they treat them. One study revealed gender differences in large animal practitioners, with females more aligned with the interests of the client and males more aligned with the interests of the animal. Given the findings of the present study, this difference may be worthy of further exploration to better understand the basis of oncology recommendations made by male and female practitioners practicing < 100% companion animal medicine.

When contemplating the recommendation to refer, respondents took into account their perceptions of how strongly the client was bonded to their dog and the financial security of the client, weighing these in relation to one another, which suggested that practitioners may take an integrative approach when assessing clients. Practitioners were most likely to refer when the client was perceived as having both a strong bond and financial security. When owners are perceived to have a strong bond with their dogs, practitioners may recommend the option of care with the greatest potential to preserve the bond. Additionally, they may recommend the option that they perceive is in alignment with their clients’ preference, believing that clients with a strong bond would prefer the option offering the highest quality of care. Evidence exists that clients with a strong bond do opt for higher quality of care options. There is also evidence that such clients adhere to practitioner recommendations more frequently than do those who have less of a bond, which could alleviate practitioners’ hesitancy to recommend a referral that could, in theory, be rejected because of the associated financial outlay. Practitioners may recognize these client proclivities and, consciously or unconsciously, take them into account when formulating recommendations for care. Given that practitioners’ recommendations are so clearly influenced by their perception of the bond, it is important that the bond and clients’ preferences for care be carefully assessed. Misperceptions could result in referral options that lack endorsement, which could reduce patient advocacy for and access to the benefits of specialty care to the detriment of both patients and clients. Practitioner perception of the bond and the accuracy of that perception may prove an interesting area for future research into the human-animal bond.
Sometimes primary care practitioners may recommend less aggressive and less expensive treatment options to clients who are financially restricted, which suggests that practitioners may be sensitive to the financial status of their clients and the costs incurred when obtaining veterinary care. Certainly, the study respondents took their perceptions of a client’s financial status into account when determining whether they would refer a dog to specialty care. The costs of specialty care are often much higher than those associated with other options, largely because of the expense of costly tests and sophisticated treatments, and are almost always a consideration, given that most clients pay for a pet’s health care with out-of-pocket funds. Practitioners may be reluctant to recommend referral if they believe it is unfeasible for the client, conscious of the potential to cause the client additional distress (eg, guilt) in addition to the distress of the diagnosis. In the effort to protect clients, options for care may be presented in a partisan manner. However, this can undermine clients’ right to make fully autonomous decisions on how to spend their money and ultimately, inadvertently, impact patient welfare. It is important to remember that one cannot predict the amount a client may be willing to spend and the associated reasons. Practitioners can be assured they are fulfilling their mandate to engage clients in fully informed decisions and avoid inadvertently limiting patient access to care when each treatment option is presented in a balanced and respectful manner. They should consider their obligations to clients as well as patients, providing they do not undermine client autonomy or conflict with the interests of patients.

The respondents in the present study also took into consideration their perceptions of each dog’s overall health status, with the likelihood of recommending a referral 1.5 times as great when the patient was perceived to be otherwise healthy, compared with the likelihood of referral when the patient was comorbidly diseased. This propensity may relate to practitioner assessment of QOL and consideration for patient well-being, with the belief that the maximal achievable extension of QOL may be limited when the patient’s QOL is already compromised by other health concerns. Practitioners need to assess patient well-being from a multisystems perspective and help clients weigh the relative risks and benefits of interventions. Care should be taken to ensure judgments of well-being are evidence based and to not limit the opportunities for patients and clients on the basis of personal opinion, which could introduce bias.

Vignette-based inquiry is an advantageous form of research for use in evaluating normative prescriptions (ie, statements of what ought to be done) and considers the clinical complexity of the real world. It avoids the risk of unreliable and biased self-reports associated with standard questionnaire or interview methods, with findings that are statistically derived. It also avoids several of the methodological problems ascribed to other methods of inquiry such as observation of patient-provider interactions involving standardized patients, peer assessment, and detailed chart review. Furthermore, vignette-based inquiry capitalizes on the central strength of the survey method: the ability to rapidly collect extensive data simultaneously from a large group of research participants.

Vignette-based inquiry measures reported intentions rather than actual behavior. Because reported intentions may be influenced by the desire to provide the right answer and, in this manner, not truly reflect actual behavior and because actual behavior could be influenced by factors not practicable within vignettes, such as veterinarian-client-patient interactions, it cannot be determined how representative a decision made within a hypothetical situation is for a real-life behavior in similar circumstances. Extensive effort was invested in establishing validity via the design and development of the questionnaire, supporting face and content validity, and the findings of the present study were consistent with a priori hypotheses, thereby supporting construct validity. However, future studies to assess the criterion validity (ie, the similarity of findings to real-world veterinarian-client-patient interactions) would serve to advance the veterinary profession’s understanding of the referral process.

Validity for vignette-based inquiry depends on the manner in which vignettes are constructed and conducted. This includes whether they are of interest to participants, are relevant to participants’ realities, and reflect realistic clinical complexity, as well as whether they incorporate open- or closed-ended questions and impose realistic time limits, with arguments for differing approaches depending on the research design, participant group, and purpose of the study. Within the present study, abiding by quality standards for the purpose at hand, the vignettes were constructed on the basis of a literature review of actual case histories as well as the extensive practice experience of primary care practitioners and the first author and were written to be interesting, relevant, and realistic, which would enable primary care practitioners to readily envision patients and clients within their own practice. The vignettes were then reviewed by experts in veterinary oncology and pretested with primary care practitioners, all of which contributed to face and content validity. Evidence substantiated these efforts because in-survey participant feedback was positive, with participants reporting that they found the study interesting, relevant, and realistic, which are perceptions known to increase the quality of the data and thereby the validity of the results.

The personal perspective in the vignettes that was intentionally chosen to maximize the ability of practitioners’ ability to relate to the scenarios within the context of their own practice, however, could be criticized. Some researchers believe that framing the vignettes in the first-person voice (as opposed to presenting a fictional practitioner in the third person and asking the participants what they think that practitioner should do) could pose greater risk of introducing social desirability bias, which could skew responses toward what would be considered a public account of practitioner recommendations. Assuming respondents that there are no right or wrong answers, however, can help circumvent this bias; this assurance...
was provided with the vignette instructions in the present study.
Normative prescriptions, such as treatment recommendations, are formed on the basis of facts (what is known in the world) and values (beliefs or judgments held about what is right or wrong, good or bad, or more or less important). Thus, the ability to generalize the findings of the present study to veterinary populations with values that differ from those within the study may be limited. Furthermore, considering that recommendations for treatment were explored with only 2 forms of cancer and 1 species of animal, the ability to generalize to broader cancer and species contexts may be limited. Additional research is needed to determine the manner in which recommendations may differ.

Because the present study was a full factorial experimental design that advantageously permitted testing for interactions, the number of variables that could be built into the vignettes was limited. As a result, other interesting factors, such as patient prognosis in relation to expected lifespan and anticipated well-being, could not be included. Consequently, it was not possible to measure the influence of anticipated QOL on the decisions practitioners made, which would be an interesting area for future research, particularly considering that QOL was identified to be of foremost importance to respondents when considering the most appropriate approach to cancer care for canine patients.

Future research efforts could make use of alternate vignette-based study designs, such as the fractional replication factorial design a and the factorial questionnaire design, b both of which can accommodate a wider range of variables. Furthermore, open-ended questions or the use of a mixed-methods modeling approach could provide more in-depth understanding of practitioner decision making, particularly with regard to reasoning. Recognition that no 1-time assessment could possibly identify all contributory factors for a subject as complex as the nature of referral decisions indicates the need for additional research in this increasingly relevant aspect of veterinary practice.

Referral to a specialty service provides the opportunity for comprehensive, state-of-the-art treatment for patients with cancer. Referrals have been understood to occur in situations of diagnostic uncertainty or treatment complexity that lie beyond a practitioner’s capability; such as when a practitioner lacks specialized expertise or the equipment required to ensure that the health needs of patients are optimally met. Knowledge of the specifics of these situations and the way in which they may influence the propensity of a veterinarian to refer a patient is lacking but is important for a better understanding of the referral process, particularly considering that it relates to patient and client well-being. The findings of the present study provided information on the veterinary referral process, specifically with regard to dogs with lymphoma or osteosarcoma. Practitioner propensity to recommend referral in those circumstances was not simply related to diagnostic uncertainty and treatment complexity but was contextually multifactorial, taking into account patient, client, and practitioner factors. Understanding such factors unquestionably has implications for the veterinary profession, but ultimately, and arguably more importantly, for the health and well-being of those we serve. For this reason, it is fundamental for best practice.

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