Use of cytology as a diagnostic method in veterinary practice and assessment of communication between veterinary practitioners and veterinary clinical pathologists

Mary M. Christopher, DVM, PhD, DACVP; Christine S. Hotz, DVM, MS, DACVP; Sonjia M. Shelly, DVM, DACVP; Paul D. Pion, DVM, DACVIM

Objective—To determine the extent of use of cytology as a diagnostic method in veterinary practice and assess how veterinarians in practice communicate with veterinary clinical pathologists.

Design—Online survey.

Study Population—870 veterinarians.

Procedures—An online survey was made available to members of the Veterinary Information Network from October 1, 2004, through December 1, 2004.

Results—Respondents reported obtaining a median of 7 cytology samples weekly (range, 0 to 100). On average, respondents reported that 48.1% of the samples they collected were evaluated in-house, 29.5% were submitted to a veterinary diagnostic laboratory, and 21.6% were evaluated in-house and then submitted to a diagnostic laboratory. Most respondents (89.2%) reported using cytologic assessments to guide additional testing, and most (80.3%) indicated that they found the comments section of the cytology report to be the most important section. When asked to indicate the importance of various factors in their decision to use cytology as a diagnostic method, respondents overwhelmingly indicated that accuracy was very important. The most common reasons for consulting with a clinical pathologist were to discuss a discrepancy between clinical and cytologic findings, to clarify a diagnosis, and to ascertain the pathologist’s confidence in a diagnosis. Respondents expressed more confidence in results when board-certified clinical pathologists were examining cytology samples than when others were.

Conclusions and Clinical Relevance—Results suggested that improving communication between veterinary practitioners and veterinary clinical pathologists could enhance the diagnostic value of cytologic examinations and improve clinical decision-making. (J Am Vet Med Assoc 2008;232:747–754)

Cytologic examination of aspirates, imprints, and other samples is an important diagnostic tool in veterinary practice. Collection of samples is generally quick and relatively noninvasive, and examination of cytology samples typically does not require any special equipment or stains beyond what would normally be found in a private veterinary practice, with the result that a diagnosis often can be made in-house. Although limitations exist in regard to sensitivity, specificity, and predictive values of positive and negative results, cytologic examination is considered the preferred diagnostic modality for many types of inflammatory, neoplastic, and other lesions. Veterinary clinical pathologists are individuals who have been board certified by the American College of Veterinary Pathologists and whose training and diagnostic practice include a major emphasis in cytopathology. Many veterinary clinical pathologists work in veterinary diagnostic laboratories, where veterinary practitioners can send cytology samples to obtain an expert opinion. The increases in companion animal caseload and specialization in the United States have fueled an expansion of veterinary diagnostic laboratories and cytology services.

The objective of obtaining and evaluating a cytology sample is to gain information on the nature of the sampled tissue that can be used to make appropriate diagnostic and therapeutic decisions about a patient and, ultimately, improve the patient’s outcome. When samples are sent to a diagnostic laboratory, effective communication between the veterinary practitioner submitting the sample and the clinical pathologist examining it is essential. The veterinary practitioner must convey sufficient information about the lesion, the sample, and the patient for the clinical pathologist to make an informed and accurate diagnosis. The clinical pathologist, in turn, must effectively convey...
accurate and complete diagnostic information to the veterinary practitioner in a relevant, timely, and comprehensible manner. A written cytology report often is the only form of communication between clinical pathologists and veterinary practitioners. Most often, these reports include a description of the microscopic findings, a morphologic or descriptive diagnosis, and additional comments. The diagnosis or comments section may express the pathologist’s degree of certainty about the diagnosis and about specific diagnoses that may be excluded. The comments section may be used to discuss differential diagnoses, prognosis, and recommendations for additional testing or treatment.

In studies7,8 by the College of American Pathologists involving surgical pathology samples submitted for histologic examination, a lack of a clinical history or clinical diagnosis was a frequent problem, and provision of inadequate clinical information contributed to delayed reports, diagnostic errors, and the need for amended reports. It also has been observed that physicians sometimes misinterpret pathology reports, fail to find pertinent information in these reports, or do not clearly understand the nature and impact of the results.4,5,9,10 These problems are exacerbated when pathologists use discipline-specific language or ambiguous terminology. In 1 study,9 for instance, surgeons misunderstood 1 or more aspects of a surgical biopsy report 30% of the time and the discrepancy between the pathologist’s intended meaning and the meaning understood by the surgeon was greatest for reports requiring more interpretation by the surgeon. Poor communication between pathologists and physicians was ranked as the most important cause of low physician satisfaction with laboratory services,9 and communication skills were identified as the greatest deficiency in newly trained medical pathologists.11 The need for effective communication between veterinary clinicians and veterinary clinical pathologists was emphasized in recent editorial12 and review articles,1 and oral and written communication skills are a major goal of many postgraduate training programs in veterinary clinical pathology.2 Standardized or synoptic reporting has been recommended as a means of improving comprehension of pathology reports.9,10,13

In a previous study14 related to terminology used in cytology reports, we found that veterinary clinical pathologists used a wide range of qualitative expressions to convey the likelihood or probability of a cytologic diagnosis and were reluctant to use numeric percentages. We also found that sample quality, availability of information about the sample and patient, and communication with the submitting clinician were important factors affecting the certainty of a diagnosis. To explore these issues further, we surveyed veterinary practitioners to investigate how they interpreted probability terms used by pathologists and the potential effect these terms had on clinical decision-making. As a part of this survey, we also asked practitioners a series of questions to better understand how they use cytology as a diagnostic method in practice and how they communicate with veterinary clinical pathologists in diagnostic laboratories. Results of these questions are provided in the present report. We believe that this information may help veterinary practitioners who submit cytology samples to veterinary clinical pathologists at diagnostic laboratories. We also believe that this information will help veterinary clinical pathologists and diagnostic laboratories better understand how practitioners use their services, the needs of practitioners relative to communication and reporting, and potential sources of miscommunication. Ultimately, the results of this study could lead to improvements in the quality of communication and cytology reporting and enhance the value of diagnostic cytology services in clinical decision-making.

Materials and Methods

The study was conducted as an online survey of members of the Veterinary Information Network. The survey included questions designed to gather demographic information (ie, year of graduation from veterinary school, year of birth, gender, present employment, and board certification), information regarding use of cytology as a diagnostic method in practice (ie, estimated number of cytology samples [eg, fine-needle aspirates, imprints, scrapings, and effusions] obtained weekly, percentage of samples evaluated in-house vs submitted to a veterinary diagnostic laboratory, reasons for use of cytologic examinations in practice, and importance of various factors in the decision to send cytology samples to a diagnostic laboratory), and information regarding communication with clinical pathologists (ie, perceived importance for a clinical pathologist to know various types of clinical and diagnostic information about the patient when examining a cytology sample, importance of various parts of the cytology report and their usefulness in clinical decision-making, reasons given by the pathologist for an inconclusive or nondiagnostic cytology result, frequency of and reasons for calling to consult with a clinical pathologist about a cytology sample, and confidence in the cytologic diagnosis based on the credentials of the individual examining the sample). Respondents had the ability to add written responses for several questions and to add free-text comments at the end of the survey. The survey also contained questions on how respondents interpreted probability terms used by pathologists and the potential effect these terms had on clinical decision-making; results of these questions will be reported elsewhere.

The survey was made available electronically to members of the Veterinary Information Network from September 1, 2004, through September 25, 2004, as a pilot survey and again from October 1, 2004, through December 1, 2004. Because only a minor change was made in the wording of a single question following the pilot survey, results of the pilot survey were included in all analyses. An introductory letter explained the rationale for the survey and indicated that individual results would be kept confidential, although respondents were given the option to include their name.

Results of the survey were downloaded electronically into a spreadsheet program and subsequently transferred into a database program for statistical analysis. Continuous data were analyzed by means of parametric (unpaired Student t test) and nonparametric (Mann-Whitney U test) methods, depending on data distribu-
tion. The least-squares linear regression method was used to test for a correlation between age and years since graduation. Categoric and ranked data were analyzed by means of χ² tests. Results were examined on the basis of gender (male vs female), employment type (general practice vs specialty or referral practice), geographic location (United States vs any country other than the United States), and experience (≤10 years vs > 10 years since graduation). A value of \( P < 0.05 \) was considered significant.

Results

A total of 913 completed surveys were submitted. However, results for only 870 surveys were considered valid. The remaining 43 surveys were considered invalid because they represented duplicate responses (\( n = 11 \); when responses differed, the most complete or most recent survey was included) or responses from veterinary students (32; graduation year listed as 2005 or later). The 43 invalid surveys were excluded from all analyses. For the 870 valid surveys, not all respondents answered all questions.

Demographic information—Demographic data were tabulated (Table 1). No significant associations were found between gender (male vs female) and practice type (general practice vs specialty or referral practice; \( P = 0.578 \)) or between gender and geographic location (United States vs other countries; \( P = 0.231 \)). Mean ± SD age of respondents (\( n = 869 \)) was 39.9 ± 9.5 years. Women (37.8 ± 8.4 years) were significantly (\( P < 0.001 \)) younger than men (44.0 ± 10.3 years). Median number of years since graduation (years of experience) was 10. Women had significantly (\( P < 0.001 \)) fewer years of experience (median, 7 years; range, 0 to 40 years) than did men (median, 17 years; range, 0 to 44 years). A significant linear correlation was found between age and years of experience (\( n = 869 \); \( r = 0.910 \); \( P < 0.001 \)). Because of the close association between age and years of experience, age was not analyzed further as an independent variable. For subsequent analyses, years of experience was dichotomized as ≤10 years (436/869 [50.2%]) and > 10 years (433/869 [49.8%]). Mean age for respondents with ≤10 years of experience (32.7 ± 5.3 years) was significantly (\( P < 0.001 \)) less than mean age for respondents with >10 years of experience (47.3 ± 6.9 years). Significantly more women (\( n = 345 [79.5\%] \)) than men (91 [20.8%]) had ≤10 years of experience (\( P < 0.001 \); \( \chi^2 \) test), but women (231 [53.3%]) and men (202 [46.7%]) comprised approximately equal numbers of veterinarians with >10 years of experience. There was a significant (\( P < 0.001 \)) association between gender and years of experience; 345 of the 436 (79.1%) respondents with ≤10 years of experience were women and 91 (20.9%) were men, and 231 of the 433 (53.3%) respondents with >10 years of experience were women and 202 (46.7%) were men. Veterinarians from countries other than the United States were significantly (\( P = 0.039 \)) overrepresented in the group with ≤10 years of experience. No difference in years of experience was found between respondents in general practice and respondents in specialty or referral practice.

Sixty-eight of the 868 (7.8%) respondents were board certified, with 33 certified by the American Board of Veterinary Practitioners; 17 certified by the American College of Veterinary Internal Medicine; 5 certified by the American College of Veterinary Surgeons; 3 certified by the American College of Veterinary Dermatology; and 1 each certified by the American Association of Oriental Medicine, American Board of Veterinary Toxicologists, Royal College of Veterinary Surgeons, American College of Poultry Veterinarians, American College of Veterinary Emergency and Critical Care, American College of Veterinary Ophthalmologists, American College of Theriogenologists, and American College of Zoological Medicine (the certifying board was not reported by 2 respondents). Twenty-nine of 742 (3.9%) veterinarians in general practice were board certified, whereas 37 of 117 (31.6%) veterinarians in specialty or referral practice were board certified. These proportions were significantly (\( P < 0.001 \)) different. Because of the low number of board-certified specialists and the close association between board certification and practice type, board certification was not analyzed further as an independent variable.

Use of cytology as a diagnostic method in practice—Respondents reported obtaining a mean of 10.1 cytology samples weekly (SD, 10.6; median, 7; range, 0 to 100; Figure 1). Respondents were asked to indicate the percentages of cytology samples they evaluated in-house, sent to a veterinary diagnostic laboratory, evaluated in-house first and then sent to a veterinary diagnostic laboratory, and sent to another type of diagnostic laboratory. On average, respondents indicated that they evaluated 48.1% of cytology samples in-house, whereas 37 of 117 (31.6%) veterinarians in specialty or referral practice were board certified. These proportions were significantly (\( P < 0.001 \)) different. Because of the low number of board-certified specialists and the close association between board certification and practice type, board certification was not analyzed further as an independent variable.

Table 1—Demographics of respondents (\( n = 870 \)) to an online survey regarding use of cytology as a diagnostic method in veterinary practice.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>576</td>
<td>66.2</td>
</tr>
<tr>
<td>Male</td>
<td>294</td>
<td>33.8</td>
</tr>
<tr>
<td>Practice type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>742</td>
<td>85.4</td>
</tr>
<tr>
<td>Specialty or referral*</td>
<td>117</td>
<td>13.5</td>
</tr>
<tr>
<td>Other†</td>
<td>10</td>
<td>1.1</td>
</tr>
<tr>
<td>Geographic location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>715</td>
<td>85.0</td>
</tr>
<tr>
<td>Other countries</td>
<td>126</td>
<td>15.0</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 10 years</td>
<td>436</td>
<td>50.2</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td>433</td>
<td>49.8</td>
</tr>
</tbody>
</table>

*Includes 36 (4.2%) respondents from veterinary schools. †Includes employment in government (2), industry (2), the military (2), and education or a pathology residency (2); retired (1); and unemployed (1). ‡Includes respondents from Canada (86), Australia (21), the United Kingdom (13), South Africa (3), Germany (2), Greece (2), Hong Kong (2), and Switzerland (2) and from Belize, Brazil, Denmark, Finland, Israel, Japan, Malaysia, New Zealand, Portugal, Romania, South Korea, Spain, Sweden, Taiwan, United Arab Emirates, and Venezuela (1 each). §Calculated as years since graduation from veterinary school.
lower for individuals in specialty or referral practice (n = 5) than for individuals in general practice (8), and percentage of samples evaluated solely in-house was significantly (P < 0.001) lower for individuals in specialty or referral practice (20%) than for individuals in general practice (50%).

When respondents were asked to select from a list of 5 reasons for using cytologic examination in practice (multiple responses were allowed), 774 (89.2%) reported using it to guide or direct additional testing, 763 (88.1%) reported using it as a screening test, 710 (81.7%) reported using it to rule out specific diseases, 612 (70.5%) reported using it for staging purposes. Cytologic examination was used for staging purposes by significantly (P = 0.001) more individuals in specialty or referral practice (47.4%) than individuals in general practice (32.3%). Twenty-two respondents supplied other reasons for using cytologic examination, including deciding on or monitoring treatment (n = 13), guiding surgical decisions (6), teaching purposes (2), and deciding when to refer (1).

Respondents were also asked to indicate, for each of 8 factors, how important (very important, somewhat important, or not important) that factor was in their decision to use cytology as a diagnostic method (Figure 2). In general, ratings for these factors did not differ significantly among groups when respondents were grouped on the basis of gender, practice type, geographic location, or years of experience, except that cost was rated as very important by a significantly (P = 0.003) higher percentage of individuals with ≤ 10 years of experience (18.3%) than individuals with > 10 years of experience (11.7%) and by a significantly (P < 0.001) higher percentage of individuals in general practice (13.9%) than individuals in specialty or referral practice (7.6%); availability of ultrasound equipment was rated as very important by a significantly (P = 0.001) higher percentage of individuals in specialty or referral practice (22.2%) than individuals in general practice (11.0%); and lack of invasiveness was rated as very important by a significantly (P = 0.017) higher percentage of individuals in other countries (40.5%) than by individuals in the United States (30.8%). Diagnosis of lipomas and mast cell tumors and examination of ear, skin, and vaginal samples were reported in the comments as the most common uses of cytologic examination. Six respondents commented that they often did not use cytologic examination because they did not obtain definitive results or believe these methods were cost-effective.

Communication between practitioners and clinical pathologists—Respondents were asked to indicate how important they thought it was for the clinical pathologist to have various types of information when evaluating a cytology sample (Figure 3). In general, ratings for these factors did not differ significantly among groups when respondents were grouped on the basis of gender, practice type, geographic location, or years of experience. However, percentages of women who indicated that it was very important for the clinical pathologist to know history, signalment, and clinical signs (82.5%) and to know results of previous cytologic examination and previous biopsy results (83.1%) were significantly (P < 0.001 and P = 0.017, respectively) higher than percentages of men (71.7% and 75.1%, respectively). Also, percentage of individuals in general practice who indi-
cated that it was very important for the clinical pathologist to know previous cytologic examination and previous biopsy results (81.3%) was significantly \( P = 0.037 \) higher than the percentage of individuals in specialty or referral practice who did (72.6%), but the percentage of individuals in general practice who indicated that it was very important for the clinical pathologist to know the working diagnosis (42.4%) was significantly \( P = 0.01 \) lower than the percentage of individuals in specialty or referral practice who did (56.4%). Two respondents suggested that digital photography and well-designed submission forms would help in communicating clinical information to clinical pathologists.

Respondents were also asked to indicate how important (most important, somewhat important, or least important) they thought each of the 3 sections of a cytology report (microscopic description, cytologic diagnosis, and comments) was in regard to their clinical decision-making (Figure 4). Percentages of individuals in specialty or referral practice who rated the description section and diagnosis section as most important \( (P < 0.001) \) higher than percentages of individuals in general practice who did \( (2.9\% \text{ and } 12.5\%) \), respectively), and percentage of individuals in specialty or referral practice who rated the comments section as most important \( (P < 0.001) \) lower than the percentage of individual in general practice who did \( (84.5\%) \). One respondent commented that many clinical pathologists assumed that veterinarians only wanted the diagnosis but that adequate microscopic descriptions were important in helping to ascertain the diagnosis.

When respondents were asked to indicate which of 3 reasons was the most common reason provided by a clinical pathologist for an inconclusive or nondiagnostic cytology sample, 358 of 717 \( (49.9\%) \) selected “poor-quality sample” (eg, lysed cells, thick smear, debris, or poor stain), 317 \( (44.2\%) \) selected “low cellularity,” and 42 \( (5.9\%) \) selected sample collection error (eg, wrong organ or missed lesion). Other reasons that were reported included perceived incompetence of the clinical pathologist or unwillingness to commit to a diagnosis \( (n = 4) \), a tissue or cell type requiring biopsy or special stains \( (4) \), unknown or reason not given \( (2) \), and blood contamination \( (1) \). Two respondents indicated that they seldom or never had nondiagnostic samples. Significant differences were not observed among groups when respondents were grouped on the basis of gender, practice type, geographic location, or years of experience.

Number of times each month that respondents called or asked to speak to a clinical pathologist about a cytology sample ranged widely \( (range, 0 \text{ to } 80; \text{ median}, 1) \) (Figure 5). When respondents were asked to select from a list of 12 reasons for calling to consult with a clinical pathologist about a cytology sample, calling because the cytologic diagnosis did not fit with the practitioner’s clinical impression was the most common (Table 2). Individuals in general practices reported significantly \( (P < 0.001) \) less often \( (\text{median, 1 time/mo}) \) than did individuals in specialty or referral practice \( (2 \text{ times/mo}) \), and significantly \( (P < 0.001) \) higher percentages of individuals in general practice called to clarify a diagnosis \( (70.7\%) \) or ask about prognosis and treatment \( (35.9\%) \) than did individuals in specialty or referral practice \( (50.0\% \text{ and } 15.3\%) \), respectively). Individuals with \( \leq 10 \text{ years of experience} \) called significantly more often than did individuals with \( > 10 \text{ years of experience} \) to determine whether the sample was adequate \( (26.7\% \text{ vs } 17.1\%; \text{ P } = 0.002) \), to find out how to improve sample quality \( (21.4\% \text{ vs } 15.7\%; \text{ P } = 0.049) \), and to ask about other possible diagnoses \( (32.8\% \text{ vs } 25.4\%; \text{ P } = 0.028) \). One respondent commented that educating clinicians in sample collection and preparation techniques improved the diagnostic value of cytology samples.

Respondents were asked to indicate how confident (very confident, somewhat confident, or not confident) they were in cytologic diagnoses provided by individuals with various qualifications (Figure 6). Individuals with \( > 10 \text{ years of experience} \) were significantly more likely than individuals with \( \leq 10 \text{ years of experience} \) to indicate that they were not confident in diagnoses provided by a veterinarian who was not board certified.
Table 2—Reasons given by respondents (n = 722) to an online survey regarding use of cytology as a diagnostic method in practice for calling to consult with a clinical pathologist regarding a cytology sample.

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. (%) of respondents</th>
</tr>
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<tbody>
<tr>
<td>Diagnosis does not fit with my clinical impression</td>
<td>559 (77.4)</td>
</tr>
<tr>
<td>To clarify a diagnosis that I don't understand</td>
<td>491 (68.0)</td>
</tr>
<tr>
<td>To find out the pathologist's confidence in the diagnosis</td>
<td>441 (61.1)</td>
</tr>
<tr>
<td>To find out what the pathologist really thinks</td>
<td>295 (40.9)</td>
</tr>
<tr>
<td>To request additional tests or stains</td>
<td>288 (40.0)</td>
</tr>
<tr>
<td>To provide additional clinical information</td>
<td>281 (38.9)</td>
</tr>
<tr>
<td>To ask questions about prognosis and treatment</td>
<td>241 (33.4)</td>
</tr>
<tr>
<td>To find out about other possible diagnoses</td>
<td>211 (29.2)</td>
</tr>
<tr>
<td>To find out whether the sample was adequate</td>
<td>159 (22.0)</td>
</tr>
<tr>
<td>To get a second opinion</td>
<td>156 (21.6)</td>
</tr>
<tr>
<td>To find out how to improve sample collection or quality</td>
<td>134 (18.6)</td>
</tr>
<tr>
<td>To determine the diagnosis</td>
<td>74 (10.2)</td>
</tr>
<tr>
<td>Other*</td>
<td>15 (2.1)</td>
</tr>
</tbody>
</table>

Respondents were given the list of 12 reasons and asked to indicate all that apply; in addition, respondents were provided an opportunity to list other reasons. *Includes to find out whether biopsy was recommended (n = 2), to develop rapport and ensure the pathologist had adequate clinical experience and information (2), to get beyond vague or uncertain diagnoses (2), to get more timely results (2), to find out what tissue to sample and how (1), to find out whether the pathologist had experience with equine samples (1), to advise of clinical information that did not appear to have been considered by the pathologist (1), to determine the prevalence of the disease in the area (1), to inquire about sample processing (1), to discuss why results did not agree with results of an in-house evaluation of the sample (1), and to inquire about lost or mishandled samples (1).

Figure 6—Level of confidence respondents (n = 721) to an online survey regarding use of cytology as a diagnostic method in practice had in cytologic diagnoses provided by individuals with various qualifications.

(56.7% vs 51.3%; P = 0.041), by a resident (7.4% vs 4.4%; P < 0.001), or by a physician who was board certified in human pathology (55.9% vs 39.7%; P < 0.001). One hundred twenty-eight of 870 (14.7%) respondents indicated that they did not know the qualifications of the person evaluating cytology samples they submitted. Individuals in specialty or referral practice were significantly (P = 0.022) less likely to know the credentials of the person examining samples (7.6%) than were individuals in general practice (15.8%). One respondent commented that the qualification of the person examining the sample did not influence his or her confidence in the diagnosis, 3 indicated they were confident in their own experience, and 1 indicated that his or her level of confidence depended on the specific disease or lesion. One respondent suggested that the size and standards of the diagnostic laboratory affected the accuracy of the results and, thus, his or her confidence in them. One respondent commented that she would not charge clients for cytologic evaluations done by someone with credentials equivalent to her own. Two respondents assumed that board-certified clinical pathologists evaluated all cytology samples sent to diagnostic laboratories. One respondent indicated that there were few board-certified clinical pathologists in her country. Two respondents suggested that more information about a laboratory's pathologists and their training would help bolster confidence, respect, and trust. Several respondents (n = 12) commented on the importance of a good working relationship between practitioners and pathologists and reported having strong rapport with 1 or more pathologists, which enhanced their confidence and comfort when consulting.

Overall comments about the survey—Many respondents (n = 60) commented that the survey was interesting, important, useful, and relevant; that the questions were direct and interesting; and that the format was easy. They also expressed appreciation for the opportunity to respond. Three respondents indicated that the survey was long and had loaded questions and questioned its usefulness. A few respondents said that the survey made them think a lot about the entire process of obtaining, submitting, and interpreting cytology samples. Several also indicated that they looked forward to learning the results of the survey and hoped they would be used to improve the comprehension of pathology reports, to help pathologists better meet the needs of practitioners, and to enhance dialogue and communication between private practitioners and pathologists. Two respondents expressed appreciation for clinical pathologists as vital members of the team and emphasized that their findings were used to make major clinical decisions.

Discussion

Results of the present study provide new information about how veterinarians use cytology as a diagnostic method in practice and about the communication between veterinary practitioners and veterinary clinical pathologists regarding cytology samples submitted to diagnostic laboratories. On the basis of our results, we suggest that improving the methods by which veterinary practitioners communicate pertinent clinical information and by which veterinary clinical pathologists communicate cytology results would likely have a strong positive impact on the value of cytology as a diagnostic method in clinical decision-making and patient outcome.

Examination of the demographics of the respondent population suggests that our results largely reflect perceptions and practices of veterinarians in general practice in the United States. However, the percentage of women (66.2%) in the study was substantially higher than the percentage of US veterinarians reported by the
AVMA to be female (46%). In addition, the percentage of survey respondents with > 10 years of experience (49.8%) was less than the estimated percentage of AVMA members with > 10 years of experience (68.3%; this percentage was arrived at by evaluating graduation dates for 914 member entries in the upper and lower corners of each page in the AVMA Membership Directory). Thus, the study population may not have been reflective of the US veterinarian population in general. However, the higher percentage of recent graduates (ie, individuals with ≤ 10 years of experience) in the study population may make the results more relevant for the future.

When survey responses were compared between respondents grouped on the basis of gender, practice type, geographic location, or years of experience, most of the significant differences were found when comparing respondents in general practice with respondents in specialty or referral practice. These findings may be attributed, in part, to greater availability of in-house cytology expertise in specialty and referral practices, such as teaching hospitals, and to greater diversity and complexity in the types of samples obtained by specialists. Although we did not ask about the specific types of samples obtained, on the basis of limited comments we received and the authors’ experience, individuals in general practice are more likely to evaluate routine cytologic samples from the ear, skin, and vagina and, occasionally, from skin or subcutaneous masses (especially those suspected to be mast cell tumors and lipomas) in-house, whereas they are more likely to send other cytology samples and samples from lesions suspected to be malignant to diagnostic laboratories. Because specialists are less likely to obtain routine cytology samples, they may rely more on clinical pathologists to evaluate cytology samples. Specialists also considered cost less important when deciding to submit cytology samples for evaluation, perhaps because clients seeking specialty services already have signaled a willingness to spend more money or because test costs may be subsidized in teaching hospitals. Several differences also were related to experience, with less experienced practitioners making an effort to send more cytology samples to laboratories for confirmation, consulting more often about sample adequacy and how to improve it, and calling to ask about differential diagnoses. Practitioners with more experience in obtaining and preparing good-quality samples may be more likely to use cytology methods to obtain a definitive diagnosis and to consider cost as less important.

Most of the respondents in the present study who were from countries other than the United States were from Canada, where the discipline of clinical pathology closely parallels that in the United States. In contrast, clinical pathology is a relatively new specialty in Europe, where a certifying college was conditionally established only in 2002, and for the Australian Society of Veterinary Pathology, which promotes advanced training in pathology, to our knowledge, other countries do not have formal clinical pathology training programs or board certification equivalent to that in the United States. This may account, in part, for differences in confidence in cytologic diagnoses made by various

laboratory professionals between respondents from the United States and respondents in other countries. Practitioners in countries other than the United States were also more likely to use cytology as a diagnostic method because of its lack of invasiveness, perhaps because they are more reluctant or clients are less willing to perform surgical biopsies. Again, it would have been useful to know more about the types of samples obtained most often by practitioners to better assess differences in the reasons for submitting cytology samples, the perceived need for consultation, and confidence in the person evaluating samples.

Compared with men, women assigned greater importance to the need for clinical pathologists to know previous cytology and biopsy results and history, signalment, and clinical signs. Because no difference was found when respondents were grouped on the basis of years of experience, this finding cannot be attributed to differences in education or to changes over time in practice. Importantly, we did not ascertain the frequency with which clinical information was actually conveyed by women or men. In a previous survey, veterinary clinical pathologists working in diagnostic laboratories indicated that clinical information about patients often was lacking, impairing their ability to give a definitive diagnosis. Lack of a clinical history or diagnosis on the requisition slip was the most common deficiency related to surgical pathology samples submitted to human diagnostic laboratories in a study by the College of American Pathologists. Thus, although most veterinarians in the present study indicated that it was very important for clinical pathologists to know clinical and diagnostic information about patients, additional study is needed to determine how often they are provided this information and whether gender or other factors may affect how often information is provided. Because a discrepancy between clinical and cytologic findings was the most commonly cited reason for consultation with a clinical pathologist, it seems likely that pertinent clinical information is not always provided on the submission form. Alternatively, submission forms may not be designed to capture the necessary information or pathologists may fail to take clinical information into account when writing their reports. Because an accurate cytologic diagnosis requires all relevant information about the patient, evaluating and identifying ways to consistently and efficiently convey this information is essential.

An interesting finding in the present study was the importance placed by respondents on the comments section of cytology reports, with few considering the microscopic description or diagnosis sections as the most important. In human cytopathology and surgical pathology practice, a microscopic description is considered optional and is included only when the pathologist thinks it is needed. This differs from the usual expectations and practice in veterinary anatomic and clinical pathology, where considerable emphasis is placed on microscopic descriptions. At 1 medical school where histologic descriptions of biopsy specimens were not included except in difficult or unusual cases, severe problems of comprehension occurred when surgeons had to interpret histologic descriptions or understand
histologic terminology. One large veterinary diagnostic laboratory recently began offering practitioners the option of a cytology report without a microscopic description (at a lower cost, presumably because writing a report without a microscopic description would take less time for their pathologists). Results of the present study suggest that this may be a valid option, provided clinical pathologists can choose to add a description on the basis of their judgment about the importance of such information in particular cases. Descriptions also have other purposes, such as providing complete documentation for the medical record and teaching clinical pathology residents, which might make it important to include them in some settings.

Our finding that most respondents indicated that poor-quality samples and low cellularity were the most common reasons provided for an inconclusive or nondiagnostic cytology sample suggests that clinical pathologists have been clearly indicating the diagnostic adequacy of cytology samples in their reports. In a previous study, poor sample quality and low cellularity were the most common reasons affecting the ability of clinical pathologists to make a definitive diagnosis. In a study of malpractice suits against medical pathologists, overinterpretation of cytology specimens of inadequate cellularity comprised a distinct subset of diagnostic errors, confirming the importance of proper cellularity in making a diagnosis. A few respondents in the present study did not know the reasons for inconclusive results or blamed inconclusive results on the pathologist, suggesting that there are opportunities for improved communication and education about the limitations of cytologic examination.

Our results suggest that it would be valuable for clinical pathologists and diagnostic laboratories to closely examine whether information deemed of most value to practitioners is consistently and effectively provided in cytology reports. General practitioners, in particular, consulted clinical pathologists to clarify a diagnosis they did not understand and to ask about prognosis and treatment. Guidelines for cytology reporting emphasize the importance of including information essential for establishing a prognosis and for helping clinicians focus their diagnostic testing and surgical and therapeutic decision-making. Efforts also should be made to ensure that the diagnosis is clear and that when a definitive result is not possible, differential diagnoses and their relative likelihood or probability are provided. Standardized or synoptic reporting can aid consistency, encourage brevity, and ensure that explicit and critical information is provided in pathology reports and can be readily extracted by clinicians. However, it is unknown whether such reporting improves comprehension.

References


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c. IDEXX Laboratories Inc, Westbrook, Me.