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Survey of occupational hazards in Minnesota veterinary practices in 2012

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Abstract

OBJECTIVE—To identify the scope of occupational hazards encountered by veterinary personnel and compare hazard exposures between veterinarians and technicians working in small and large animal practices.

DESIGN—Cross-sectional survey.

POPULATION—Licensed veterinarians and veterinary staff in Minnesota.

PROCEDURES—A survey of Minnesota veterinary personnel was conducted between February 1 and December 1, 2012. Adult veterinary personnel working in clinical practice for > 12 months were eligible to participate. Information was collected on various workplace hazards as well as on workplace safety culture.

RESULTS—831 eligible people responded, representing approximately 10% of Minnesota veterinary personnel. A greater proportion of veterinarians (93%; 368/394) reported having received preexposure rabies vaccinations than did veterinary technicians (54%; 198/365). During their career, 226 (27%) respondents had acquired at least 1 zoonotic infection and 636 (77%) had been injured by a needle or other sharps. Recapping of needles was reported by 87% of respondents; the most common reason reported by veterinarians (41%; 142/345) and veterinary technicians (71%; 238/333) was being trained to do so at school or work. Recent feelings of depression were reported by 204 (25%) respondents. A greater proportion of technicians (42%; 155/365) than veterinarians (21%; 81/394) indicated working in an environment in which employees experienced some form of workplace abuse.

CONCLUSIONS AND CLINICAL RELEVANCE—Veterinary personnel in Minnesota were exposed to several work-related hazards. Practice staff should assess workplace hazards, implement controls, and incorporate instruction on occupational health into employee training.

Exposures to occupational hazards in the clinical veterinary medical setting are common. Surveys[1–7] have revealed that 50% to 67% of veterinarians and 98% of veterinary

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technicians experience an animal-related injury at some point in their careers. Reported mechanisms of these injuries include animal bites, kicks, and scratches and crushing by equipment used for animal restraint. Other occupational threats to health include chemical, physical, and biological hazards.[8,9]

Dermatophytosis and bite wound infections are the 2 most commonly reported zoonotic infections of veterinarians and technicians working in clinical practice; however, many other occupational zoonotic infections have been reported.[10–16] Physical hazards are those that pose a threat of physical harm to individuals and include animal and equipment-related injuries as well as radiation exposure and needlestick and sharps injuries.[8] Musculoskeletal disorders in veterinary personnel are associated with trauma and repetitive movements.[17–19] Shoulder and neck pain in large animal veterinarians arising ostensibly from rectal palpation are the most commonly reported MSDs, although MSDs affecting other body parts have been reported by large animal personnel.[17,19–21] Chemical agents used in veterinary practice, including topical medications, hormones, pesticides, disinfectants, and antineoplastic agents, can pose mild to severe health hazards to those handling them.[8,9,22] Environments in which animals are kept can pose both respiratory and physical health hazards to animal caregivers and veterinary personnel.[23,24] Asthma, allergies, hearing loss, frostbite, and other conditions are all possible hazards of the veterinary work environment. Reproductive hazards exist in many forms in veterinary settings and can adversely affect pregnancy or reproductive status of women of childbearing age.[25–29] Mental-health or psychosocial hazards, such as stress, substance abuse, or certain conditions in the work-place, can lead to depression, anxiety, and suicide of veterinary personnel.[30–35]

Most reported studies[2,5,6,35] involving occupational hazards in veterinary medicine have focused on veterinarians only, often on a single exposure or work-place hazard. The objectives of the study reported here were to identify the scope of occupational hazards in all types of veterinary personnel in Minnesota, including office staff, and to compare exposures between veterinarians and technicians and between veterinary personnel working in small and large animal practices.

Materials and Methods

Study design

A cross-sectional study design was used. An anonymous survey of Minnesota veterinary personnel was conducted between February 1 and December 1, 2012. Adult veterinary personnel who worked in clinical veterinary practice for > 12 months prior to the survey date were eligible to participate. Participants had the option to complete the 86-question survey, which required approximately 30 minutes to complete, electronically or on paper. Various types of occupational hazards were addressed in the survey as well as safety culture in the workplace that might influence exposures to hazards. A subset of questions was designed to gather information regarding the respondents' experience during the past 12 months, during formal veterinary training (if applicable), and throughout their entire career to date. Before dissemination, the survey tool was preliminarily evaluated by a convenience sample of 15 veterinary personnel residing within the United States.

Survey questions on infectious disease focused on rabies prevention, occupationally acquired zoonotic infections, and infection control practices. Questions on physical hazards focused on animal-related injuries, needlestick or sharps injuries, needle disposal, and radiation protection. Animal injuries were defined as an animal-induced injury resulting in hospitalization, missing at least half a day of work, or inability to work at the usual pace for at least 5 days. Questions regarding occupationally acquired MSDs included body site of the injury, and responses were summarized accordingly. Questions on chemical hazards addressed potentially hazardous substances used in practice and the frequency with which respondents wore gloves while handling such substances (reported by use of a 5-point Likert scale [1 = never; 2 = rarely; 3 = sometimes; 4 = often; and 5 = always]). Respiratory hazards were assessed through questions on allergies and asthma among personnel. A subset of questions from a validated questionnaire[36,37] (Patient Health Questionnaire-9) was used to assess depression and anxiety, workplace environment, and frequency of unhealthy work-related stress in the past 12 months, during veterinary school, and throughout the respondent's career. Only females were asked to respond to questions on reproductive hazards, which gathered information on common hazards that could adversely impact pregnancy. Questions regarding safety culture within the workplace were designed to capture perceptions of veterinary personnel regarding use of personal protective equipment, animal restraint, and other safety protocols. Respondents were also asked to state their degree of agreement with various statements related to the safety culture in veterinary practice.

Study recruitment

Prior to study commencement, the survey was advertised to practicing Minnesota veterinary personnel in the quarterly newsletter of the Minnesota Veterinary Medical Association and via flyers and inserts at annual meetings of that association and of the Minnesota Association of Veterinary Technicians. Packets containing 10 cover letters that described the study objectives and provided a link to the online survey, 2 paper surveys, and postage-paid return envelopes were mailed to all 635 veterinary practices in Minnesota. Additionally, email invitations containing the survey link were sent to all members of the Minnesota Association of Veterinary Technicians and all licensed veterinarians in the state with an email address on file with the Minnesota Board of Veterinary Medicine. Follow-up telephone calls were made to 162 (26%) randomly selected veterinary practices to encourage participation and provide additional materials if needed.

Statistical analysis

For statistical analysis of the survey responses, veterinary personnel were grouped into 3 categories: veterinarians, veterinary technicians (including veterinary assistants, certified technologists, and technicians), and office staff (including practice managers, receptionists, and kennel help). Survey respondents were classified as working in small animal practice or large animal practice, with large animal practice defined as reported treatment of any large animal species (including mixed practices or those that reported any treatment of food animals or horses). The χ^2 test was used to compare distributions of categorical variables between veterinarians and veterinary technicians and between small and large animal personnel. The 2-sample, 2-sided t test was used for comparisons involving mean ages of respondents. All variables were independently adjusted by gender and years of working in

clinical practice. All analyses were conducted by use of a statistical software package.[a] Because of the large number of hypotheses tested, the Bonferroni correction was applied to most test results by dividing an initial *P* value used to indicate significance (0.05) by the number of comparison groupings (eg, veterinarian vs veterinary technician or large animal vs small animal; n = 34). Values of $P \leq 0.001$ (ie, 0.05/34) were therefore considered significant unless otherwise specified.

Results

Nine hundred eighty-six veterinary personnel responded to the survey on occupational hazard exposure, with 78% (765/986) completing the survey online. Of these, 831 (84%) respondents were eligible to participate and successfully completed the entire survey. Three hundred ninety-four (47%) respondents were veterinarians, 365 (44%) were veterinary technicians, and 72 (9%) were office staff (Table 1). As of February 2012, the Minnesota Board of Veterinary Medicine reported 2,034 licensed veterinarians and an estimated 5,600 veterinary technicians in Minnesota; therefore, study participants represented 19% of licensed veterinarians and 7% of veterinary technicians, for a total response rate of approximately 10% of Minnesota veterinary personnel. No known population estimates existed for veterinary office staff in Minnesota.

Median age of respondents was 39 years (range, 20 to 89 years); 80% were female, 98% were white, and 2% were Hispanic. The majority of respondents (n = 548; 66%) self-identified as small animal personnel. Small animal personnel were significantly ($P < 0.001$) younger and more likely to be female than were large animal personnel (Table 1). Similarly, small animal veterinarians were significantly ($P < 0.001$) more likely to be female than were large animal veterinarians (72% vs 46%, respectively). A significantly ($P < 0.001$) larger proportion of veterinary technicians worked in small animal practice than worked in large animal practice (48% vs 35%, respectively).

Infectious disease

A total of 578 (70%) veterinary personnel reported having received preexposure rabies vaccinations. A significantly ($P < 0.001$) higher proportion of veterinarians received preexposure rabies vaccinations than did veterinary technicians (93% vs 54%, respectively). Although the difference was not significant (ie, $P = 0.02$), a higher proportion of veterinary technicians versus veterinarians were tested for rabies neutralizing antibody titers within 2 years before the survey date (35% vs 29%, respectively). Thirteen percent of vaccinated veterinarians and 3% of vaccinated veterinary technicians reported not having had their rabies virus antibody titer checked in > 10 years (Table 2).

Two hundred twenty-six (27%) respondents indicated acquiring at least 1 zoonotic infection at some point during their career. The most common zoonotic infections reported were dermatophytosis (68%) and bite wound infections (48%). Other commonly reported zoonotic infections reported included salmonellosis (7%) and cryptosporidiosis (6%). Three hundred four (37%) respondents, including 139 (35%) veterinarians, 142 (39%) veterinary

[a]SAS, version 9.2, SAS Institute Inc, Cary, NC.

technicians, and 23 (32%) office staff, were familiar with the National Association of State Public Health Veterinarians' Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel.[38] The means by which respondents were introduced to this publication included colleagues (30%), the *JAVMA* (30%), and continuing education courses (37%). Responses were not mutually exclusive. A total of 347 (42%) personnel indicated that their practice had an infection control plan, which is a major recommendation of the document.[38]

Physical hazards

Two hundred sixty-nine (32%) respondents reported sustaining an animal-related injury during their careers that resulted in hospitalization, missing at least a half day of work, or inability to work at the usual pace for at least 5 days. Thirty-four percent of veterinarians and veterinary technicians alike reported sustaining a serious animal-related injury during their careers, whereas 6% of veterinarians and 5% of veterinary technicians reported having sustained a serious animal-related injury within the past 12 months (Table 2). Thirty-nine percent of veterinarians reported self-medicating their illnesses or self-treating their injuries, compared with 13% of veterinary technicians ($P < 0.001$).

Needlestick or sharps injuries were common, with 636 (77%) respondents reporting having sustained at least 1 injury at some point in their careers and 344 (41%) reporting having sustained at least 1 injury within the past 12 months (Table 2). Furthermore, 88% of veterinarians, 91% of veterinary technicians, and 68% of office staff reported recapping needles after use. Veterinary technicians were significantly ($P < 0.001$) more likely than veterinarians to report having been trained to recap needles at school or work (71% vs 52%, respectively). Although the difference was not significant ($P < 0.002$) by the definition used in the study, a greater proportion of veterinarians than veterinary technicians reported unavailability of dedicated disposal containers as a reason for recapping needles (41% vs 25%, respectively).

Veterinary technicians were significantly ($P < 0.001$) more likely to perform radiography than were veterinarians (95% vs 85%). No other significant differences were identified between the 2 groups regarding use of radiation safety equipment and strategies.

MSDs

Two hundred ninety-five (35%) respondents indicated that they currently had or had at 1 time developed an MSD as a result of their work (Table 2). Back, shoulder, neck, and wrist MSDs were most commonly reported. A significantly ($P = 0.001$) greater proportion of large animal veterinarians had an MSD (57%) than had small animal veterinarians (39%). No significant differences were identified between large and small animal personnel or between large and small animal veterinarians regarding MSDs of the shoulder region or back specifically (Table 3).

Chemical hazards

Numbers of all respondents reporting routine handling of various chemicals on the job were as follows: hormones, 294 (35%); cleaning agents, 730 (88%); sterilizing agents, 600 (72%);

chemotherapeutic agents (including antineoplastic drugs), 88 (11%); chloramphenicol, 152 (18%); and pesticides, 308 (27%). Scores for frequency of glove use when handling chemicals ranged from 1 (never) to 5 (always) for all of these substances. The median score was 3 (sometimes) for all substances except chemotherapeutic agents, for which the median score was 5.

Respiratory health

One hundred thirty-two (16%) respondents reported currently having asthma, with 87 (10%) reporting having had asthma prior to working in veterinary medicine (Table 2). No significant difference in asthma prevalence was identified between small and large animal veterinarians and personnel (Table 4). Forty (5%) respondents reported that their asthma symptoms had worsened since working in veterinary medicine, and 6 (1%) reported having had to change career focus as a result of asthma. Two hundred nineteen (26%) respondents reported having allergies, with 139 (17%) having had those allergies prior to working in veterinary medicine. One hundred one (12%) reported that their allergy symptoms had worsened since working in veterinary medicine, and 13 (2%) reported having had to change career focus (eg, from large to small animal medicine) as a result of allergies.

Mental health

A total of 737 (89%) respondents were generally happy in their current job position (Table 2). However, 282 (34%) reported that workplace stress adversely affected their health or well-being in the past 12 months, and 68 (8%) respondents reported missing work because of work-related stress in the past 12 months. No significant differences were identified in responses between veterinarians and veterinary technicians.

Many respondents reported some form of hostility at work, including social exclusion of employees (n = 191; 23%), yelling (112; 13%), bullying (88; 11%), throwing of items (55; 7%), threats (28; 3%), and physical violence (5; 1%). A significantly ($P < 0.001$) larger proportion of veterinary technicians than veterinarians reported working in what would be considered an unhealthy work environment with ≥ 1 of the aforementioned conditions (42% vs 21%, respectively).

One hundred sixty-five (20%) respondents indicated “feeling little interest or pleasure in doing things,” and 204 (25%) reported “feeling down, depressed, and hopeless” during their career. Twenty-two percent indicated that they had sought medical care for depression at some point during their career, 16% had doctor-diagnosed anxiety, and 9% had doctor-diagnosed depression. No significant differences were detected between veterinarians and veterinary technicians regarding indices for anxiety or depression.

Reproductive health

Of 662 female respondents, 284 (43%) reported at least 1 pregnancy during their career (Table 2). Of these, 17 (6%) believed they had experienced an adverse reproductive outcome (eg, miscarriage or preterm labor) as a result of their work in veterinary medicine. Miscarriage (n = 7; 41%) was the most commonly reported adverse outcome.

Two hundred sixty-three of the 284 (93%) female respondents who were ever pregnant during their veterinary career reported taking additional precautions while pregnant (Table 2). Such precautions included wearing gloves more frequently while at work (n = 61; 23%), avoiding heavy lifting (102; 39%), and limiting exposure to radiation (139; 53%). Two hundred thirty-three of 284 (82%) female respondents reported participating in at least 1 activity that could adversely impact their pregnancy while pregnant, including restraining animals for radiographs (71; 30%); participating in (90; 39%) and recovering animals from (156; 67%) surgery in which inhalant anesthetics were used; handling or administering injectable reproductive hormones (9; 4%), topical parasiticides, or other chemicals (87; 37%) used in practice without wearing gloves; lifting animals or equipment that weighed > 22.7 kg (> 50 lb) without assistance (63; 27%); and working > 40 h/wk (171; 73%).

Ninety-two of 284 (32%) female veterinary personnel reported that their employer required that they take additional precautions while they were pregnant, whereas 28 (10%) reported resistance from employers or colleagues to their attempts at taking additional precautions. Although the difference was not significant ($P = 0.02$), a larger proportion of veterinary technicians reported mandatory workplace safety policies for pregnant employees than did veterinarians (38% vs 24%, respectively; Table 2).

Workplace safety culture

Two hundred ninety (35%) respondents indicated that they considered their job to be dangerous (Table 2). Between 72% and 94% of respondents strongly agreed or agreed with statements regarding a positive workplace safety culture (Table 5). However, 258 (31%) respondents reported having been taught or having witnessed veterinary personnel being essentially instructed to protect the veterinarian at all costs (Table 2).

Discussion

All veterinary personnel are at risk of encountering occupational hazards in the clinical veterinary setting. The purpose of the present study was to characterize exposures to most common hazards experienced by various types of personnel working in such environments. The results supported previous findings for practicing veterinarians and provided new perspectives on hazards encountered by other members of the veterinary clinical staff.[17–21,23–28]

Thirty-two percent of Minnesota veterinary personnel in the present study reported having sustained a serious animal-related injury at some point in their career, compared with between 50% and 98% of veterinary personnel throughout the United States in other studies.[1–5] Although injury rates were lower for veterinary personnel in Minnesota versus the rest of the country, only veterinarians or veterinary technicians were surveyed in previous studies,[1–5] and animal-related injury was less stringently defined than in the present study. Importantly, we found that veterinary technicians were just as likely to sustain an animal-related injury as were veterinarians, underscoring the importance of establishing a strong safety culture within the workplace, supplying appropriate animal-restraint equipment, and providing training in animal behavior and restraint for the entire veterinary team.

Both veterinarians and support staff reported routinely recapping needles but provided different reasons for doing so. Although not significant from a statistical perspective, a larger proportion of veterinarians than veterinary technicians reported a lack of readily available containers for discarding needles as their reason for recapping needles. On the other hand, the primary reason reported by both veterinarians and veterinary technicians was that they were trained to do so. Therefore, instruction on the importance of avoiding recapping needles (ie, to avoid needlestick injury) will need to be addressed within the 2 groups. Designated containers for discarding needles and other sharps should be located in every area in which animal care takes place to make it more convenient for veterinary personnel to use the containers.[38] Veterinary support staff should be taught proper needle-handling techniques, and the importance of proper needle disposal should be enforced among veterinarians.[4,7,9,39–51]

As was also identified in a previous study,[52] veterinarians were more likely to receive preexposure rabies vaccinations than were veterinary technicians in the study reported here. Most veterinary medical colleges require students to be vaccinated against rabies, whereas most Minnesota veterinary technology programs recommend, but do not require, that their students receive the vaccinations.[b] Furthermore, the authors' experience is that some people working as veterinary technicians have not undergone formal training in veterinary technology, and those individuals may not receive preexposure rabies vaccinations unless required by or paid for by their employer.

Individuals identified by the Advisory Council on Immunization Practices as frequently exposed to rabies, including veterinarians and veterinary technicians, should have serum antibody titers against the rabies virus checked every 2 years and receive a booster vaccine when the titer is < 1:5 as determined via the rapid fluorescent focus inhibition test or approximately 0.10 U/mL.[53] Nine percent of respondents completing our survey who received preexposure rabies vaccinations were > 10 years overdue for a rabies virus antibody testing and are potentially at risk of infection.

The species of patients cared for influences the types of infectious agents to which veterinary personnel are exposed in their careers.[7,10–15,38–40,54–65] In the present study, dermatophytosis was the most common zoonotic infection acquired by veterinary personnel, which is consistent with findings of previous studies.[10,12,13] Other zoonoses commonly reported in the present study included bite wound infections and enteric infections caused by *Salmonella* spp and *Cryptosporidium* spp, reaffirming the importance of environmental infection control practices, infection control plans, and regular staff training to raise awareness of infectious hazards.[16,38]

Previous studies[17,19–21] have revealed that lifting, performing surgery and rectal palpation, and animal handling are tasks commonly related to MSDs in veterinarians. Such associations are likely attributable to the awkward postures and repetitive motions involved with these activities. Interestingly, after adjustment for respondent gender and number of

[b]Scheftel JM, Supervisor, Zoonotic Diseases Unit, Minnesota Department of Health, Saint Paul, Minn: Personal communication, 2013.

years in practice in the present study, we found no association between type of practice (small vs large animal focus) and type of MSD reported, even for MSDs of the shoulder region or back. The lack of an association might have been explained by changes in veterinary practice, such as the availability of walk-on scales in small animal practice and an increase in the use of ultrasonography for pregnancy diagnosis in large animal practice.

In 2012, the prevalence of asthma in adults in the United States was approximately 8%.[66,67] In contrast, a prevalence of 16% was identified in veterinary personnel that responded to our survey during the same year. Similarly, 26% of veterinary personnel reported having allergies, compared with 9% of the general population identified as having had allergy symptoms in the past 12 months in another study.[67] However, 10% of veterinary personnel in the present study reported having asthma and 17% reported having allergies prior to working in veterinary medicine. Exposure to organic dust, animal dander, and other proinflammatory compounds[68–75] found in various veterinary clinical settings likely put veterinary personnel at risk for developing asthma or allergies. More research is needed to establish causation and to determine the most likely triggers.[23,24,76–80]

Occupational hazards to reproductive health that are encountered during pregnancy can lead to adverse reproductive outcomes, including spontaneous abortion, low birth weight, and preterm delivery.[81] Working > 40 h/wk and participating in work activities that require bending, lifting, or other strenuous physical movement increase the probability of adverse reproductive outcomes.[81–83] The hazards that exist in veterinary medicine, however, are often unique to the field and extend beyond physical activities. In veterinary medicine, personnel are at risk for animal-related injuries, needlestick or sharps injuries, acquiring infectious diseases, and exposure to radiation and harmful chemicals that can impact gestation. Studies[28,29,43,50,84–87] designed to focus specifically on veterinary tasks have identified associations between spontaneous abortion and performance of tasks such as obtaining radiographs, recovering animals from anesthesia, and handling pesticides. In the present study, a majority of female veterinary personnel who were pregnant at some point in their careers indicated knowing about and taking necessary precautions while pregnant; however, most of these women also reported participating in activities that could adversely impact pregnancy, suggesting a disconnect between attitudes and practices. Given the potential consequences associated with exposures to reproductive hazards in veterinary medicine, employers should create a work environment and safety culture that encourage pregnant employees to consistently take precautions and avoid risky practices (for example, ensuring sufficient personnel to allow reassignment of hazardous duties to others). In addition, staff training should emphasize the importance of informing a manager of a pregnancy as soon as possible so accommodations can be made to avoid reproductive hazards.

Results of UK studies[31,32] suggest that veterinarians are twice as likely as physicians, nurses, and dentists to commit suicide. Furthermore, healthcare professionals are 4 times as likely to commit suicide as are the general public.[31] Reasons underlying the high suicide rate among veterinarians are not yet understood.[34] In the present study, symptoms of depression were used as a proxy for impaired mental health. We also collected information on doctor-diagnosed anxiety and depression. Nine percent of respondents reported doctor-

diagnosed depression, and this proportion exceeded the 5.9% of all Minnesota residents estimated as having depression on the basis of Behavioral Risk Factor Surveillance System survey results from 2008.[88] We found that symptoms of depression and anxiety were reported by veterinary support staff as well as veterinarians, highlighting the importance of addressing this issue among all veterinary personnel.

The majority of respondents reported working in practices with a workplace culture that supported taking safety precautions and indicated that they believed that appropriate measures were taken in their practices to avoid injury. Despite a third of respondents reporting that they considered their occupation to be dangerous, most indicated being happy with their job in veterinary medicine.

The present study had several limitations. The low proportion of respondents from the target population may have limited the representativeness of study findings to veterinary personnel in Minnesota. For veterinarian respondents, the median age was 48 years (range, 25 to 89 years) and 61% were female, compared with a median age of 47 (range, 25 to 92) and female proportion of 55% for all active licensed veterinarians on record with the Minnesota Board of Veterinary Medicine. No such demographic information was available for Minnesota veterinary technicians for comparison with technician respondents. A possible reason for the low response rate was the length or subject matter of the survey, given that several respondents expressed concern in the comments section of the survey that regulation of the profession might increase as a result of the study. A limitation with respect to results interpretation is that we used the Bonferroni correction approach, which is a conservative method designed to reduce the likelihood of making a type I error when a high number of hypotheses are tested. When this was done, the possibility existed of failing to identify legitimate differences. Additionally, infectious disease and other hazards included in the survey may have been associated with veterinary practice but also could have existed outside the work environment, and respondent exposure to external sources of the same hazards was not evaluated.

Findings of the study reported here supported the concept that, although it is not possible to eliminate all hazards associated with veterinary practice, employers should conduct a workplace risk assessment and implement appropriate control measures. Adherence to a well-developed employee safety and health program that includes regular staff training will minimize the risk of injury and illness. Veterinary colleges and veterinary technician programs should include specific workplace safety and occupational health lectures or courses in their core curriculum with a focus on animal-bite and injury prevention, needle handling and disposal, avoiding reproductive hazards, and promoting mental health. Veterinary medical organizations should consider offering continuing education courses on topics related to worker safety and fostering a safety-focused workplace environment. Finally, with equal importance to staff training and educational efforts, veterinary practice owners and managers should take a leadership role in creating a healthy work environment by championing and modeling desired behaviors.

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ABBREVIATION

MSD	Musculoskeletal disorder

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Table 1

Median (range) age and number (%) of Minnesota veterinary personnel with various characteristics who responded to a survey on occupational hazards.

Characteristic	All respondents (n = 831)	Small animal practice (n = 548)	Large animal practice* (n = 283)	*P* value†
Age (y)	39 (20–89)	37 (21–89)	43 (20–77)	< 0.001
Race and ethnicity				
White	812 (98)	533 (97)	279 (99)	0.34
Hispanic	13 (2)	7 (1)	6 (2)	0.36
Female	662 (80)	468 (85)	194 (69)	< 0.001
Veterinarians only	394 (47)	234 (43)	160 (57)	0.002
Age (y)	48 (25–89)	46 (25–89)	50 (27–77)	0.05
Female	241 (61)	168 (72)	73 (46)	< 0.001
Position				
Owner	202 (51)	108 (46)	94 (59)	0.01
Associate	171 (43)	109 (47)	62 (39)	0.12
Relief staff	16 (4)	14 (6)	2 (1)	0.02
Retired‡	5 (1)	3 (1)	2 (1)	1.0
Veterinary technicians only	365 (44)	265 (48)	100 (35)	< 0.001
Age (y)	32 (20–64)	32 (21–64)	34 (20–64)	0.35
Female	356 (98)	258 (97)	98 (98)	0.89
Position				
Technician	263 (72)	197 (74)	66 (66)	0.11
Assistant	94 (26)	60 (23)	34 (34)	0.03
Retired‡	6 (2)	6 (2)	0 (0)	0.19
Student	2 (1)	2 (1)	0 (0)	0.44
Office staff only	72 (9)	49 (9)	23 (8)	0.79
Age (y)	43 (20–73)	41 (24–73)	49 (20–60)	0.59
Female	65 (90)	42 (86)	23 (100)	0.06
Position				
Practice manager	36 (50)	27 (55)	9 (39)	0.01
Receptionist or office worker	33 (46)	20 (41)	13 (57)	0.93
Kennel help	3 (4)	2 (4)	1 (8)	0.76

*Large animal practice included respondents who worked in mixed, equine, or food animal practice.

†*P* values represent comparisons between small and large animal practices. Because of the large number of hypotheses tested, values of $P \leq 0.001$ were considered significant.

‡Respondents who indicated that they were retired were included because they met the criteria of having worked in clinical practice for at least 12 months prior to the start of the survey. The authors believed the reported exposures of these individuals were necessary to include in the study results. Recent exposures from this group were not captured.

Table 2

Number (%) of veterinary personnel reporting various occupational hazards as part of the survey in Table 1.

Hazard	All personnel (n = 831)	Veterinarians (n = 394)	Veterinary technicians (n = 365)	Office staff (n = 72)	*P* value*	Adjusted *P* value†
Infectious disease						
Underwent post-exposure rabies vaccination	92 (11)	68 (17)	24 (7)	0 (0)	< 0.001	0.45
Received preexposure rabies vaccinations‡	578 (70)	368 (93)	198 (54)	12 (17)	< 0.001	< 0.001
Rabies antibody titer checked within 2 y	178 (31)	106 (29)	69 (35)	3 (25)	< 0.001	0.02
Rabies antibody titer not checked in 10 y	54 (9)	47 (13)	5 (3)	2 (17)	0.01	0.95
At least 1 zoonotic infection acquired during career§	226 (27)	129 (33)	90 (25)	7 (10)	0.01	0.70
Dermatophytosis	153 (68)	81 (63)	66 (73)	6 (86)	0.21	0.10
Bite wound infection	109 (48)	64 (50)	40 (44)	5 (71)	0.46	0.89
Cryptosporidiosis	14 (6)	12 (9)	2 (2)	0 (0)	0.05	0.004
Salmonellosis	15 (7)	13 (10)	1 (1)	1 (14)	0.03	0.12
Self-medicated illness or injury	204 (25)	153 (39)	47 (13)	4 (6)	< 0.001	< 0.001
Animal-related injury						
Sustained at some point during career	269 (32)	135 (34)	123 (34)	11 (15)	0.85	0.08
Sustained during formal veterinary training	71 (9)	51 (13)	19 (5)	1 (1)	0.004	0.003
Sustained within the past 12 mo	42 (5)	22 (6)	20 (5)	0 (0)	0.93	0.81
Needlestick or sharps injury						
Sustained at some point during career	636 (77)	327 (83)	284 (78)	25 (35)	0.08	0.45
Sustained within the past 12 mo	344 (41)	173 (44)	167 (46)	4 (6)	0.59	0.16
Ever recap needles	727 (87)	345 (88)	333 (91)	49 (68)	0.08	0.35
Reason for recapping needles (when reported)						
Dedicated disposal container unavailable	230 (32)	142 (41)	83 (25)	5 (10)	< 0.001	0.002
Trained to do so at school or work	451 (62)	181 (52)	238 (71)	32 (65)	< 0.001	< 0.001
Radiation protective equipment use						
Perform radiography	739 (89)	336 (85)	347 (95)	56 (78)	< 0.001	< 0.001
Perform radiography and wear equipment						
Lead apron	722 (98)	327 (97)	342 (99)	53 (95)	0.26	0.47
Thyroid gland protector	395 (53)	154 (46)	210 (61)	31 (55)	< 0.001	0.07

Hazard	All personnel (n = 831)	Veterinarians (n = 394)	Veterinary technicians (n = 365)	Office staff (n = 72)	*P* value*	Adjusted *P* value†
Lead gloves	357 (48)	192 (57)	137 (39)	28 (50)	< 0.001	0.32
Dosimeter	378 (51)	157 (47)	192 (55)	29 (52)	0.004	0.005
Perform radiography and sedate animals beforehand	87 (12)	53 (16)	28 (8)	6 (11)	0.004	0.31
MSD						
Had any MSD	295 (35)	183 (46)	107 (29)	5 (7)	< 0.001	0.06
Had MSD of the shoulder region	110 (13)	77 (20)	30 (8)	3 (4)	0.02	0.69
Changed career because of the shoulder MSD	16 (2)	12 (3)	3 (1)	1 (1)	0.03‖	0.41
Had MSD of the back	199 (24)	120 (30)	75 (21)	4 (6)	0.33	0.46
Changed career because of the back MSD	21 (3)	14 (4)	7 (2)	0 (0)	0.16	0.65
Respiratory health						
Have asthma	132 (16)	52 (13)	67 (18)	13 (18)	0.05	0.13
Had asthma prior to working in veterinary medicine	87 (10)	31 (8)	44 (12)	12 (17)	0.59	0.05
Have had worsening of asthma symptoms since working in veterinary medicine	40 (5)	18 (5)	20 (5)	2 (3)	0.52	0.22
Have allergies	219 (26)	106 (27)	96 (26)	17 (24)	0.84	0.41
Had allergies prior to working in veterinary medicine	139 (17)	65 (16)	58 (16)	16 (22)	0.96	0.75
Have had worsening of allergy symptoms since working in veterinary medicine	101 (12)	50 (13)	46 (13)	5 (7)	0.81	0.79
Mental health						
Happy with current position in veterinary medicine	737 (89)	352 (89)	315 (86)	70 (97)	0.13	0.52
Workplace stress adversely affected health or well-being in past 12 mo	282 (34)	127 (32)	137 (38)	18 (25)	0.12	0.04
Missed work because of work-related stress in past 12 mo	68 (8)	22 (6)	42 (12)	4 (6)	0.004	0.27
Witnessed or was a victim of workplace abuse	264 (32)	81 (21)	155 (42)	28 (38)	< 0.001	< 0.001
Social exclusion of employees	191 (23)	54 (14)	117 (32)	20 (28)	< 0.001	< 0.001
Yelling	112 (13)	38 (10)	66 (18)	8 (11)	< 0.001	0.04
Threats	28 (3)	6 (2)	20 (5)	2 (3)	0.005	0.04
Bullying	88 (11)	23 (6)	57 (16)	8 (11)	< 0.001	0.01
People throwing items	55 (7)	16 (4)	35 (10)	4 (6)	0.003	0.05
Physical violence	5 (1)	2 (1)	3 (1)	0 (0)	0.60	0.92
Have little interest or pleasure in doing things in the past month	165 (20)	67 (17)	88 (24)	10 (14)	0.01	0.91

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Hazard	All personnel (n = 831)	Veterinarians (n = 394)	Veterinary technicians (n = 365)	Office staff (n = 72)	*P* value*	Adjusted *P* value†
Feeling down, depressed, and hopeless in the past month	204 (25)	88 (22)	105 (29)	11 (15)	0.03	0.91
Have sought medical care for depression during career	179 (22)	87 (22)	83 (23)	9 (13)	0.83	0.43
Have or had doctor-diagnosed anxiety	132 (16)	40 (10)	81 (23)	11 (15)	< 0.001	0.08
Have or had doctor-diagnosed depression	78 (9)	40 (10)	35 (10)	3 (4)	0.82	0.15
Reproductive health¶						
Was pregnant at some point while working in clinical practice	284 (43)	118 (30)	141 (40)	25 (38)	0.03	0.24
Had at least 1 adverse reproductive outcome	17 (6)	8 (7)	9 (6)	0 (0)	0.84	0.95
Took additional precautions at work while pregnant	263 (93)	111 (94)	132 (94)	20 (80)	0.88	0.80
Participated in at least 1 activity that may have negatively impacted pregnancy	233 (82)	98 (83)	120 (85)	15 (60)	0.02	0.01
Experienced resistance from coworkers to taking additional precautions while pregnant (when reported)	28 (10)	4 (3)	24 (17)	0 (0)	0.001	0.005
Office policy included task restrictions during pregnancy for employees	92 (32)	28 (24)	53 (38)	11 (44)	0.02	0.01
Workplace safety culture						
Consider job dangerous	290 (35)	153 (39)	126 (35)	11 (15)	0.28	0.53
Was taught or witnessed teaching of the “protecting the veterinarian at all costs” policy	258 (31)	110 (28)	136 (37)	12 (17)	0.007	0.71

**P* values represent comparisons between veterinarians and veterinary technicians. Because of the large number of hypotheses tested, values of $P \leq 0.001$ were considered significant.

†Differences between veterinarians and veterinary technicians were adjusted for gender and number of years in practice.

‡Respondents to rabies titer questions included only those that indicated receiving preexposure rabies vaccinations.

§Respondents to zoonotic disease questions included only those that indicated having had a zoonotic infection at some point during their career.

‖*P* value represents result of the Fisher exact test.

¶Reproductive health questions were limited to female respondents (n = 662).

See Table 1 for remainder of key.

Table 3

Number (%) of veterinary personnel in small or large animal practice reporting MSDs and their outcomes as part of the survey in Table 1.

	All personnel				Veterinarians only			
Variable	**Small animal (n = 548)**	**Large animal (n = 283)**	***P* value†**	**Adjusted *P* value†**	**Small animal (n = 234)**	**Large animal (n = 160)**	***P* value***	**Adjusted *P* value†**
Had any MSD	169 (31)	126 (45)	< 0.001	0.002	92 (39)	91 (57)	< 0.001	0.001
Had MSD of the shoulder region	51 (9)	59 (21)	0.003	0.04	28 (12)	49 (31)	< 0.001	0.01
Changed career because of their shoulder MSD	5 (1)	11 (4)	0.007	0.04	2 (1)	10 (6)	0.009≠	0.04
Had MSD of the back	123 (22)	76 (27)	0.04	0.08	67 (29)	53 (33)	0.04	0.14
Changed career because of their back MSD	10 (2)	11 (4)	0.08	0.35	5 (2)	9 (6)	0.07	0.14

≠*P* value represents result of the Fisher exact test.

See Tables 1 and 2 for remainder of key.

Table 4

Number (%) of veterinary personnel in small or large animal practice reporting respiratory ailments as part of the survey in Table 1.

	All personnel				Veterinarians only			
Variable	**Small animal (n = 548)**	**Large animal (n = 283)**	***P* value†**	**Adjusted *P* value†**	**Small animal (n = 234)**	**Large animal (n = 160)**	***P* value***	**Adjusted *P* value†**
Currently have asthma	99 (18)	33 (12)	0.02	0.15	39 (17)	13 (8)	0.02	0.06
Had asthma prior to working in veterinary medicine	71 (13)	16 (6)	0.01	0.05	26 (11)	5 (3)	0.06	0.09
Had worsening of asthma symptoms since working in veterinary medicine	28 (5)	12 (4)	0.38	0.41	11(5)	7 (4)	0.13	0.04
Changed career focus because of asthma	3 (0.5)	3 (1)	0.39‡	0.26	2 (1)	3 (2)	0.39‡	0.07
Currently have allergies	163 (30)	56 (20)	0.003	0.03	72 (31)	34 (21)	0.04	0.14
Had allergies prior to working in veterinary medicine	99 (18)	40 (14)	0.21	0.13	42 (18)	23 (14)	0.46	0.55
Had worsening of allergies since working in veterinary medicine	74 (14)	27 (10)	0.83	0.82	33 (14)	17 (11)	0.79	0.63
Changed career focus because of allergies	9 (2)	4 (1)	0.02	0.67	4 (2)	2 (1)	1.00‡	0.92

‡*P* value represents result of the Fisher exact test.

See Tables 1 and 2 for remainder of key.

Table 5

Number (%) of all veterinary personnel at various degrees of agreement with statements regarding workplace safety culture as part of the survey in Table 1.

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I take appropriate preventive measures against animal-related injuries in the presence of the owners of the animals (n = 785)	281 (36)	456 (58)	32 (4)	14 (2)	2 (0.3)
I feel comfortable refusing to provide services when appropriate help or animal restraint is not available (n = 797)	242 (30)	375 (47)	80 (10)	86 (11)	14 (2)
Sufficient time is allowed in the schedule to perform adequate animal restraint (n = 805)	168 (21)	439 (55)	109 (14)	80 (10)	9 (1)
There is adequate equipment for proper animal restraint (n = 802)	190 (24)	470 (59)	77 (10)	55 (7)	10 (1)
There is adequate staff help available for proper animal restraint (n = 790)	145 (18)	426 (54)	110 (14)	90 (11)	19 (2)
There is good communication among personnel regarding injury prevention (n = 788)	172 (22)	444 (56)	114 (14)	42 (5)	16 (2)