

# Work-Related Injuries to Animal Care Workers, Washington 2007–2011

Heather Fowler, VMD,<sup>1\*</sup> Darrin Adams, BS,<sup>2</sup> David Bonauto, MD,<sup>2</sup> and Peter Rabinowitz, MD<sup>1</sup>

**Background** For workers engaged in animal care, workplace hazards are common and may outnumber those experienced by human healthcare workers.

**Methods** We used accepted Washington State workers' compensation claims for the period from January 1, 2007 and December 31, 2011 to compare injury rates and types of injuries across animal care occupations.

**Results** Work-related injuries frequently affect veterinary support staff and those working in pet stores, shelters, grooming facilities and kennels. Animal-related injuries were the most commonly reported injury type experienced by all groups, though the animal source of injury appears to differ by work setting.

**Conclusions** Workplace related injuries among animal care workers are common and most often caused by physical insults resulting from worker-animal interaction. *Am. J. Ind. Med.* 59:236–244, 2016. © 2015 Wiley Periodicals, Inc.

**KEY WORDS:** veterinary; veterinary medical/animal care workers; animal-related injury; animal bite; dogs; cats; pet stores; grooming; shelters; and kennels

## INTRODUCTION

Animal care workers comprise a diverse workforce trained to provide medical care and other services to a variety of animal species. These workers can be found in varied settings including farms, veterinary care facilities, and pet services. For workers engaged in animal care, workplace hazards are common and may outnumber those experienced by human healthcare workers [Landercaasper et al., 1988; Gabel and Gerberich, 2002; Nienhaus et al., 2005]. Animal

care workers are exposed to a spectrum of chemical, biological, and physical hazards resulting in an array of work injuries, including animal-related injuries, needlestick/sharps injuries, musculoskeletal disorders (MSDs), allergic reactions, asthma, compassion fatigue, stress, burnout, and zoonotic infectious disease among others [Jeyaretnam and Jones 2000]. Despite knowledge of these hazards, exposures continue to be commonplace with no reductions seen in recent surveys [Wiggins et al., 1989; Wright et al., 2008]. Recently, the National Institute for Occupational Safety and Health (NIOSH) updated the National Occupational Research Agenda (NORA) for the Healthcare and Social Assistance Sector to include a number of goals for reducing occupational hazards in veterinary medical and animal care (VM/AC) workers [NIOSH, 2013]. NORA calls for studies that focus on the assessment of major occupational hazards to VM/AC workers leading to the development and implementation of interventions that reduce the incidence of occupational injury and illness.

A review of the veterinary medical literature suggests that occupational injuries are prevalent in the clinical veterinary setting [Landercaasper et al., 1988; Poole et al., 1998, 1999; Gabel and Gerberich, 2002; van Soest and

<sup>1</sup>Department of Environmental and Occupational Health Sciences, University of Washington School of Public Health, Seattle, Washington

<sup>2</sup>Washington State Department of Labor and Industries, Olympia, Washington

\*Correspondence to: Heather Fowler, VMD, MPH, PhD Student, Occupational and Environmental Hygiene, BEBTEH Senior Fellow, Department of Environmental and Occupational Health Sciences, Center for One Health Research (COHR), University of Washington School of Public Health, 1959 NE Pacific Street, F551, Seattle, WA 98195, Box 357234. E-mail: hfowler@uw.edu

Accepted 7 November 2015

DOI 10.1002/ajim.22547. Published online 17 December 2015 in Wiley Online Library (wileyonlinelibrary.com).

Fritschi, 2004; Fritschi et al., 2006; Lucas et al., 2009]. Prior research estimates 50–67% of licensed clinical veterinarians and 98% of veterinary technicians experience an animal-related injury at some point in their careers [Nienhaus et al., 2005; Weese and Faires, 2009]. The reported mechanisms of these injuries include bites, kicks, scratches, and being crushed by equipment used for animal restraint. When these exposures lead to serious injury or illness, the worker may suffer lost work time and disability. In such instances, if eligible for workers' compensation, a claim may be filed to assist in the cost of medical care and wage replacement.

Prior analyses of American Veterinary Medical Association Professional Insurance and Liability Trust workers' compensation data have reported that the most common injuries in the veterinary care setting are animal related injuries including bites, kicks, and scratches, as well as worker sprains and falls [Hub International, 2007]. In 2007, the organization reported that nearly 70% of the claims and \$4.2 million of the incurred losses involved contact with animals. Overexertion events leading to back and shoulder strains accounted for 8% of the claims and \$1.5 million of the incurred losses.

While previous studies have characterized occupational injuries among veterinarians, less is known about the occupational injury risk to the larger group of non-veterinarian animal workers, including veterinary technicians and assistants and workers in pet stores, shelters, kennels, and animal grooming facilities. According to the Bureau of Labor Statistics, these workers accounted for almost 400,000 jobs in 2012, with 232,000 jobs being held by animal care workers and 146,000 by veterinary technicians, technologists, and assistants including laboratory animal workers, greatly outnumbering the approximately 90,000 veterinarians working in the nation by a rate of nearly 4:1 [Bureau of Labor Statistics, 2014]. Washington State employment for 2013, estimated 1,500 veterinarians, 1,790 veterinary technicians and technologists, 1,960 veterinary assistants and laboratory animal care workers, and 3,970 nonfarm animal care workers [Peinecke and Saibel, 2013]. Yet, despite their large representation in animal care field compared to veterinarians, this group of workers has been relatively neglected in research efforts related to their occupational health and safety.

In order to characterize occupational injuries across a spectrum of animal care workers in Washington, we performed a descriptive analysis of the workers' compensation claims filed during the 5-year period from 2007 to 2011 for two groups of workers, those in "veterinary clinics", including veterinarians and other clinical veterinary personnel, and those in "grooming and other services" which includes workers in kennels, shelters, pet stores, and animal grooming services.

## MATERIALS AND METHODS

### Description of Workers' Compensation System

The Washington State Department of Labor and Industries' (L&I) State Fund (SF) is the exclusive provider of workers' compensation insurance to all Washington State employers, except those that are able to self-insure or are covered by alternative workers' compensation systems (e.g., the federal government). Workers' compensation coverage is compulsory for almost all Washington State employers. Elective workers' compensation coverage is available to the self-employed, employers of one household worker or other minor occupational groups exempt from mandatory coverage. Washington State statutes and regulations guide Washington workers' compensation insurance coverage requirements, claims administration procedures and insurance benefits [Washington State Department of Labor & Industries, 2014]. Using this system, employers pay workers' compensation premiums based on the number of full-time equivalent employees (FTE) reported quarterly within specific risk classifications.

When a worker is injured or made ill by workplace exposures, a worker and a health care provider complete and submit a Report of Industrial Injury or Occupational Disease form (RIIOD) to initiate a workers' compensation claim. The worker portion of the RIIOD contains demographic and employment information as well as the workers' narrative regarding how the injury occurred. The health care provider portion of the RIIOD includes the diagnosis, medical information regarding objective findings, treatment and diagnostic recommendations and an opinion regarding the work-relatedness of a diagnosed condition. From these data the nature of the injury, source of the injury, body part, and injury event according to the Bureau of Labor Statistics' Occupational Injury and Illness Classification system are coded [Bureau of Labor Statistics, 2012]. Occupation of the injured employee is assigned according to the 2000 Standard Occupational Classification system [Bureau of Labor Statistics 2010]. Work-related musculoskeletal disorders are identified by a combination of injury event, body part, and ICD-9 codes consistent with specific musculoskeletal disorders (e.g., carpal tunnel syndrome, rotator cuff syndrome).

Claims submitted to the state can either be rejected or accepted. Accepted claims can be medical-only or compensable. Compensable claims involve injuries where either wage replacement for time loss occurred, a disability award was paid, a fatality occurred or the worker was kept on salary during the course of claim.

### Data Ascertainment, Variable Definitions

We examined all available records for employers insured through the Washington State Fund. From this

database, we identified State Fund (SF) workers' compensation claims with dates of injury between January 1, 2007 and December 31, 2011, which were reported in workers' compensation risk classes of interest. A risk classification characterizes the work conducted at the establishment according to the risk for insurance loss. For this study we used two risk classes: Veterinary Hospitals and Clinics [Washington Administrative Code 296-17A-6107] which we term "Veterinary Clinics," and Pet Stores, Grooming, Shelters and Kennels [Washington Administrative Code 296-17A-7308] which we term "Grooming and other services." Veterinary clinics include establishments where licensed clinical veterinarians and their staff, that is, veterinary technicians, technologists, assistants, and clerical staff, practice veterinary medicine, dentistry and surgery. Grooming and other services includes establishments that operate animal shelters/services, dog pounds, or humane societies which care for lost or unwanted pets with the assistance of clinical veterinary personnel, groomers, and non-farm animal caretakers, that is, generalized caretakers employed in the animal care sector. Establishments that provide pet grooming services, boarding pets and pet stores not otherwise classified are also included in the grooming and other services category. Job tasks vary by job description though the common presence of an animal patient/client provides the greatest risk for injury.

For each SF workers' compensation claim, we identified the claim status as accepted or rejected. Accepted claims were further classified as compensable or medical aid only. Hours reported by risk class were summed across employer accounts. One FTE was defined as 2000 hrs. Data were obtained from the workers' compensation databases on June 30, 2013.

One employer transitioned to self-insured coverage during the last 2 years. We retained this employer's claims for consistency. For the period when the employer was self-insured, fewer details were available about the medical aid only claims, specifically data for the worker's occupation, nature of injury, and accident type.

## Data Analysis

We conducted descriptive analyses to compare injury type distribution across occupations utilizing accepted and compensable claims. Claim rates were calculated using total FTEs as the denominator and values reported per 10,000 FTE. Claim rate ratios and 95% confidence intervals around these estimates comparing rates between the two risk classes: veterinary clinics; and grooming and other services were determined for each year of the study period as well as overall for the five-year study period. Counts and frequencies were reported across occupations for major injury types. Work-related musculoskeletal disorders (WMSDs) were

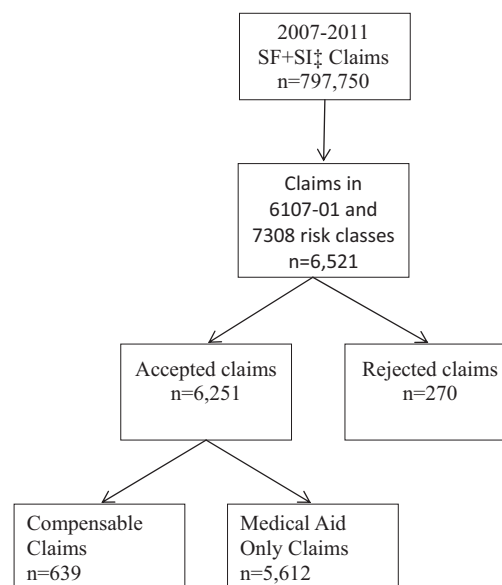
further characterized by the animal source and body parts affected, respectively. This study was determined to be exempt by The Washington State Institutional Review Board. All analyses were performed with Microsoft Office Excel 2007 and SAS 9.1.

## RESULTS

### Accepted Claims

In the 5-year study period from 2007 to 2011, there were 797,750 workers' compensation claims received by the Washington State Department of Labor and Industries with a total of 6,521 filed by those in veterinary clinics, and grooming and other services. Of the 6,521 claims, 6,251 (95.9%) were accepted. Of the accepted claims, 639 (10.2%) were compensable and 5,612 were medical aid only (89.8%) (Fig. 1). For accepted claims, 1,324 (21.2%) were filed by veterinary technologists, 1,308 (20.9%) by veterinary assistants, 381 (6.1%) by veterinarians, 1,854 (29.7%) by nonfarm animal caretakers, and 1384 (22.1%) among "other" professionals (Table I).

A decreasing trend in claim rates was seen over the 5-year study period with highest rates seen in both groups in 2007 and the lowest in 2011. Accepted claim rates among employees in grooming and other services ranged from 1,575 to 2,581 per 10,000 FTE during the 5-year study period with an overall accepted claim rate of 2,191 per 10,000 FTE



**FIGURE 1.** Disposition of Washington State Workers' Compensation Claims for 2007–2011. There were 6,521 claims filed, 6,251 were accepted (270 rejected). Of the accepted claims, 5,612 were medical aid only. There were 639 compensable (those including time loss or other indemnity payment made to the claimant). SF + SI, State Fund (SF) + Self-Insure (SI).

**TABLE I.** Distribution of Injury Type by Occupation: Washington Workers' Compensation Accepted Claims, 2007–2011<sup>a</sup>

Injury type group	Veterinary technologists n (%)	Veterinary assistants n (%)	Veterinarians n (%)	Nonfarm animal caretakers n (%)	Other n (%)	Total n
Falls	35 (10.5)	45 (13.5)	4 (1.2)	114 (34.1)	136 (40.7)	334
Overexertion (non WMSD)						
Any overexertion	8 (11.6)	12 (17.4)	4 (5.8)	24 (34.8)	21 (30.4)	69
Lifting overexertion	8 (24.4)	3 (9.1)	0 (0.0)	13 (39.4)	9 (27.3)	33
Struck (Trauma)						
Animal bite/scratch/kick	1023 (25.2)	1003 (24.7)	297 (7.3)	1088 (26.8)	651 (16)	4062
Struck by/ against other objects	89 (15.5)	83 (14.4)	34 (5.9)	197 (34.3)	172 (29.9)	575
Exposure to harmful substances or environments	24 (19.4)	24 (19.4)	7 (5.7)	42 (33.9)	27 (21.8)	124
WMSDs back and upper extremities						
Any WMSDs back and upper extremities	67 (16.0)	52 (12.4)	9 (2.2)	171 (40.9)	119 (28.5)	418
Lifting overexertion	38 (18.4)	35 (16.9)	9 (4.4)	70 (33.8)	55 (26.6)	207
WMSDs of the lower extremity						
Any WMSDs of the lower extremity	12 (9.2)	16 (12.3)	6 (4.6)	39 (30.0)	57 (43.9)	130
Lifting overexertion	1 (14.3)	2 (28.6)	0 (0.0)	2 (28.6)	2 (28.6)	7
All other events	19 (6.5)	33 (11.3)	11 (3.8)	94 (31.2)	135 (46.2)	292
All injuries	1324 (21.2)	1308 (20.9)	381 (6.1)	1854 (29.7)	1384 (22.1)	6251

<sup>a</sup>Includes all allowed claims (excludes 270 rejected claims).

WMSDs, work-related musculoskeletal disorders.

(Table II), while claim rates among veterinary clinic workers ranged from 1,367 to 1,588 per 10,000 FTE with an overall claim rate of 1,487 per 10,000 FTE. Claim rate ratios comparing accepted claim rates in the grooming and other services to those in veterinary clinics ranged from 2.7 to 4.2 with a 5-year claim rate ratio of 2.8 (95%CI: 2.4–3.3).

Among injury types reported (Table I) “struck by” (including bites, scratches, and kicks) was the most commonly reported, with 4,637 accepted claims occurring

during the study period, followed by work-related musculoskeletal disorders or WMSDs of the back and upper extremity with 625 claims. The majority of all injury claims were filed by non-veterinarians including veterinary technicians (n = 1,324), veterinary assistants (n = 1,308), and non-farm animal workers (n = 1,834).

WMSDs were common in both veterinary clinic workers and grooming and other services workers with 330 (46%) and 382 (54%) being reported in each group, respectively

**TABLE II.** Workers' Compensation Claims Rate<sup>a</sup> by Risk Class (Grooming<sup>b</sup> and Other Services vs. Veterinary Clinics), 2007–2011, Washington State

	2007	2008	2009	2010	2011	2007–2011
Compensable claims						
Claims						
Grooming, count (Rate)	83 (396.0)	83 (381.6)	74 (341.8)	57 (255.9)	52 (222.5)	349 (317.2)
Veterinary clinics, count (Rate)	72 (145.5)	73 (141.6)	42 (81.2)	53 (102.0)	50 (93.3)	290 (112.3)
Claim rate ratio						
Grooming rate/ vet clinics, rate ratio (95% CI)	2.7 (2.0,3.7)	2.7 (2.3,7)	4.2 (2.9,6.2)	2.5 (1.7,3.7)	2.4 (1.6,3.5)	2.8 (2.4,3.3)
Accepted claims						
Claims						
Grooming, count (Rate)	541 (2580.9)	498 (2289.4)	555 (2563.5)	448 (2010.9)	368 (1574.5)	2410 (2190.6)
Veterinary clinics, count (Rate)	786 (1587.9)	807 (1566.7)	707 (1367.3)	711 (1367.9)	830 (1548.0)	3841 (1486.8)
Claim rate ratio						
Grooming rate/ vet clinics, rate ratio (95% CI)	1.6 (1.5,1.8)	1.5 (1.3,1.6)	1.9 (1.7,2.1)	1.5 (1.3,1.7)	1.0 (0.9,1.2)	1.5 (1.4,1.6)

<sup>a</sup>Claim rates per 10,000 full-time equivalent (FTE) employee; One FTE = 2000 hrs.<sup>b</sup>Grooming and Other Services category represents Pet stores, Grooming, Shelters, and Kennels risk class.

**TABLE III.** Work-Related Musculoskeletal Disorders by Body Part by Risk Class 2007–2011<sup>†</sup>, Washington State Workers' Compensation Claims

Body part affected	Veterinary industry n (%)	Grooming n (%)
Back	152 (46.1)	163 (42.6)
Arm	62 (18.8)	90 (23.6)
Shoulder	47 (14.2)	61 (16.0)
Leg	33 (10.0)	27 (7.1)
Multiple Locations	21 (6.4)	34 (8.9)
Neck	15 (4.5)	7 (1.8)
All Body Parts	330 (46.3)	382 (53.7)

Grooming category represents Pet stores, Grooming, Shelters, and Kennels risk class.

<sup>†</sup>Column percentage.

(Table III). The back was the most common body region affected in both groups, followed by the arm and shoulder. WMSDs affecting other body parts and multiple injury locations were less common.

Of the 4,062 accepted animal-related injury claims, 2,812 (69.2%) were filed by veterinary clinic workers and 1,250 (30.8%) among grooming and other services workers. Cats were the most common animal source for animal related injuries in veterinary clinic workers accounting for 63.1% of claims, followed by dogs (34.2%) (Table IV). In contrast in grooming and other services workers dogs were more common than cats as a source of injury with 57.6% of claims involving dogs versus 37.2% of claims involving cats. Dogs were the most common animal source for overexertion from lifting in both risk classes, accounting for 68.6% and 52.9% of these claims in the veterinary clinic, and grooming and other services groups, respectively. In both groups, WMSD claims from lifting non-animal sources (e.g., bags, boxes, cartons, and other inanimate objects) accounted for a large

proportion of accepted claims (veterinary clinics: 26.6%, grooming and other services: 43.9%).

## Compensable Claims

Of the 6,521 accepted claims, 639 (10.2%) were compensable, with 349 (14.5%) occurring in grooming and other services workers and 290 (7.6%) in veterinary clinic workers. Compensable claim rates for grooming and other services ranged from 223 to 396 per 10,000 FTE with an overall claim rate of 317 per 10,000 FTE and from 81 to 146 per 10,000 FTE in veterinary clinic workers with an overall rate of 112 per 10,000 FTE (Table II). Similar to accepted claims, a decreasing trend in claim rates is seen for both groups over the 5-year study period. Additionally, rate ratios comparing compensable claim rates in grooming and other services workers to the veterinary clinic workers ranged from 1.0 to 1.9 annually to a 5-year claim rate ratio of 1.5 (95%CI: 1.4, 1.6).

Trends in the occupational representation and distribution of injury types in the compensable claims mimicked those seen in accepted claims with a majority of the 639 compensable claims being filed by veterinary support staff (Table V). Being “struck by an object” was the most common injury type with a total of 243 reports, of which 194 (80%) involved an animal injury source.

Of the 194 compensable animal-related claims (Table IV), 106 (54.6%) occurred among veterinary clinic workers and 88 (45.4%) among grooming and other services workers. Among these claims, cats remained the primary animal source (54.7%) in veterinary clinics while dogs were the primary source in grooming and other services (57.6%). Dogs represented the most common animal source for overexertion from lifting compensable claims in both groups though non-animal sources were the most common source of injury in grooming and other services workers.

**TABLE IV.** Species Involved in Animal Related Injuries by Risk Class 2007–2011, Washington State Workers' Compensation Claims

Source of injury	Allowed		Compensable	
	Veterinary industry n (%)	Grooming <sup>a</sup> n (%)	Veterinary industry n (%)	Grooming <sup>a</sup> n (%)
Animal bite/scratch/kick				
Dogs	962 (34.2)	720 (57.6)	40 (37.7)	69 (78.4)
Cats	1775 (63.1)	465 (37.2)	58 (54.7)	13 (14.8)
Other	75 (2.7)	65 (5.2)	8 (7.6)	6 (6.8)
Lifting overexertion				
Dogs	85 (68.6)	65 (52.9)	14 (48.3)	15 (42.9)
Cats	2 (1.6)	1 (0.8)	2 (6.9)	0 (0.0)
Other	4 (3.2)	3 (2.4)	3 (10.3)	2 (5.7)
Non-animal	33 (26.6)	54 (43.9)	10 (34.5)	18 (51.4)

<sup>a</sup>Grooming category represents Pet stores, Grooming, Shelters, and Kennels risk class.

**TABLE V.** Distribution of Injury Type by Occupation: Washington Workers' Compensation Compensable Claims, 2007–2011<sup>a</sup>

<b>Injury type group</b>	<b>Veterinary technologists n (%)</b>	<b>Veterinary assistants n (%)</b>	<b>Veterinarians n (%)</b>	<b>Nonfarm animal caretakers n (%)</b>	<b>Other n (%)</b>	<b>Total n</b>
Falls	15 (16.3)	8 (8.7)	1 (1.1)	34 (37)	34 (37)	92
Overexertion (non WMSD)						
Any overexertion	1 (6.7)	5 (33.3)	0 (0.0)	6 (40.0)	3 (20.0)	15
Lifting overexertion	3 (30.0)	0 (0.0)	0 (0.0)	5 (50.0)	2 (20.0)	10
Struck by						
Animal bite / scratch / kick	45 (23.2)	37 (36.3)	9 (8.8)	67 (65.7)	36 (35.3)	194
Struck by / against other objects	3 (6.1)	5 (10.2)	1 (2.0)	20 (40.8)	20 (40.8)	49
Exposure to harmful substances or environments	1 (16.7)	0 (0.0)	1 (16.7)	4 (66.7)	0 (0.0)	6
WMSDs back and upper extremities						
Any WMSDs back and upper extremities	21 (15.3)	15 (11)	2 (1.5)	65 (47.5)	34 (24.8)	137
Lifting overexertion	3 (5.8)	11 (21.2)	1 (1.9)	18 (34.6)	19 (35.6)	52
WMSDs of the lower extremity						
Any WMSDs of the lower extremity	4 (10.3)	3 (7.7)	5 (12.8)	10 (25.6)	17 (43.6)	39
Lifting overexertion	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
All other events	5 (11.63)	5 (11.6)	2 (4.7)	18 (41.9)	13 (30.2)	43
All injuries	102 (16)	90 (14.1)	22 (3.4)	247 (38.7)	178 (27.9)	639

<sup>a</sup>Includes all allowed claims where a time loss or other indemnity payment has been made to the claimant (excludes 270 rejected and 5,612 medical aid only claims). WMSDs, work-related musculoskeletal disorders.

## DISCUSSION

This descriptive analysis of 5 years of workers' compensation claims reveals that occupational injuries are common among all VM/AC workers. These findings identified animal-related trauma including bites, kicks and scratches as the most commonly reported injury type in both worker groups studied. Frequency of injuries across job descriptions varied greatly, with higher claim counts found for non-veterinarian support staff than veterinarians. Furthermore, injury counts were higher for workers in non-veterinary occupations including workers in grooming and other services. Animal source of injury differed between the two worker groups evaluated with dogs serving as the most common source of animal-related injuries in grooming and other services while cats were the most common source in the veterinary clinics. WMSDs from lifting dogs was the most common animal source in both worker groups. These findings have important implications for prevention among VM/AC workers.

This study contributes to the literature surrounding VM/AC workers, by reporting differences in claim rates between workers employed in veterinary medical versus animal care facilities. Potential explanatory factors for our observed differences in claim rates include (i) increased reporting tendency for minor injury in the grooming and other services; [Landercaasper et al., 1988; Nienhaus et al., 2005]; (ii) less safety training or work experience in animal care in grooming and other services workers relative to workers

in veterinary clinics, leading to higher injury rates; (iii) differing exposure to risk of animal injury based on the work roles in caring for animals [Burns, 2013; Freiwald et al., 2014]; and (iv) the inability of workers in grooming and other services, which includes pet stores, shelters and kennels to legally prescribe and/or administer controlled substances such as tranquilizer drugs to aggressive pets receiving their services without the presence of a veterinarian on the premises.

In terms of veterinary worker injury claims, our study found that animal-related injury claims for veterinary support staff far outnumbered those for veterinarians in this sample. Among veterinary support staff, nonfarm animal caretakers were the most common group to incur an animal related injury in the study period; however, this group also constituted the largest fraction of workers in the analysis across both worker groups. Possible reasons for the observed disparities include differences in education and training, in reporting behavior, and in occupational exposure risk. In the United States, a veterinary degrees requires 4 years of undergraduate education and 4 years of medical training while veterinary technicians/technologists complete 2–4 years of technology training at a formal institution. [Bureau of Labor Statistics, 2013]. Veterinary assistants and nonfarm animal caretakers on the other hand represent a broad array of support staff and thus their training varies by job title ranging from formal to on-the-job training. The effect of training on reduction of injury risk among veterinary workers is an area in need of further study. Given their medical training, clinical

veterinary personnel may at times self-medicate rather than pursue professional treatment, which could affect injury and illness reporting rates [Landercasper et al., 1988; Gabel and Gerberich, 2002]. One study of licensed clinical veterinarians in Minnesota and Wisconsin showed that almost 70% of veterinarians treated their injuries by either suturing lacerations, self-prescribing antibiotics and even reducing their own fractures and/or dislocations [Landercasper et al., 1988]. More recently a study of clinical veterinary personnel in Minnesota found that up to 39% of respondents reported self-medicating their injuries and illnesses, suggesting the pervasive and persistent nature of this behavior in the veterinary community [Fowler et al., 2016]. Similarly, occupational tasks associated with job titles may vary in terms of injury risk, with some higher risk tasks assigned to support personnel; this may explain some of the observed differences in claim rates between support staff and veterinarians. The tasks performed by support staff often require more frequent and intense interaction with animals than other more specialized workers [Osborne and Richardson, 2006].

Our findings are consistent with other studies documenting the public health impact of animal bites. The CDC estimates that 4.5 million people are bitten by dogs annually; however, little to no data exist for those specifically at risk for dog bites given their occupation. Numerous studies assessing occupational hazards in the veterinary setting however, suggest that physical trauma experienced from animal bites are the most common physical injury reported in the profession [Landercasper et al., 1988; Jeyaretnam et al., 2000; Gabel and Gerberich 2002; Fritschi et al., 2006]. One study of veterinary personnel in Minnesota found equal proportions of reported injuries in the previous 12 months among veterinarians and non-veterinarian support staff [Fowler et al., 2016]. That study however did not include other animal care professionals in the sample. If this identified incidence is truly elevated in non-veterinarian VM/AC workers, the lack of formal training in animal restraint among these workers in comparison to veterinary technologists and technicians could explain the observed difference.

Differences in the animal source of injury between veterinary and non-veterinary animal care workers were evident. Cats were the most common cause of physical injury in the clinical veterinary setting, whereas dogs were the most common injury source for animal care professionals in the grooming and other services category. It is possible that differences in animal patient populations between the risk classes in our study exist. A study by Freiwald et al. [2014] suggests that owner willingness to pay for veterinary care is comparable between dog and cat owners; however, that cat owners are less likely to spend time or money training their pets. In addition, monetary expenditure for veterinary services has been found to be greater among dog owners than cat owners with more frequent veterinary visits being

identified by those with dogs [American Veterinary Medical Association, 2012]. This trend likely also applies to expenditure on other items and services including pet food, supplies, and boarding.

Little is known about the presence of safety controls in the care of animals in pet stores, grooming, shelters and kennels, that is, “grooming and other services” workers, relative to the veterinary clinic workers. In a case control study aimed at identifying risk factors for animal-related injuries in the clinical veterinary setting, Drobatz and Smith [2003] found that caregivers were more likely to be bitten by cats and older dogs. The authors found that despite these patients having a history of biting, a cage sign warning of a potential bite and/or possessing other characteristics thought to be associated with biting, muzzles or other protective equipment were only used 37–55% of the time, suggesting a reduced perception of risk among professionals in the clinical veterinary setting. In order to reduce the prevalence of injury and potential disease from various animal species, best practices should be implemented at all times and additional care taken around commonly implicated domestic animal species.

WMSDs experienced by VM/AC workers during this study period were most commonly associated with lifting dogs. Studies investigating tasks associated with WMSDs have been conducted primarily among large animal veterinarians [Scuffham et al., 2010a,b]. These findings suggest that activities such as rectal palpation and other obstetric procedures predispose large animal veterinarians to shoulder and back MSDs. Information regarding other clinical veterinary fields and animal care workers in the grooming, kennels, shelters industry however are not available. In small animal veterinary hospitals and animal services sectors dogs are often lifted onto tables prior to the administration of services or treatments. Personal and environmental factors like proper footing, lifting angle, and characteristics of the lifter can predispose personnel to injury when lifting these animals [Howard and Adams, 2011]. Additionally, it is estimated that 24–30% of the pet dog population is overweight. Obesity in pets is often associated with numerous adverse health outcomes and likely requires additional veterinary care, thus increasing exposure to veterinary medical staff [Laflamme, 2012]. Hydraulic lift tables are commonly found in veterinary practices and can be seen as an engineering control to preventing lifting injuries. But, like any proposed alternative solution, these tables are not devoid of potential harm. Pets must be trained to stand on the tables and/or are held in place while the table is lifted to prevent injury to the pet while the table is moving.

Non-animal related lifting overexertion including lifting inanimate objects, such as bags and boxes, also accounted for a majority of lifting injuries among the surveyed workers and was the most common cause of WMSD compensable claims in grooming and other services workers. The prevalence of

these injuries may mirror those in other industries in the state allowing for follow up studies comparing the frequency and severity of such injuries among those who work with animals and those who don't. Poor lifting practices coupled with the lifting/handling overweight or obese animals may put workers at risk for WMSDs. In order to avoid this type of injury, personnel should take the appropriate precautions when lifting animals and other heavy objects while at work. In addition, employers should ensure that animal workers are informed of the most up-to-date recommendations for injury prevention and that they foster a workplace environment that puts safety and health of workers first.

One limitation of this study is the lack of employment data by occupation to allow the calculation and comparison of incidence rates by occupation. Instead, denominators consisted of FTEs reported by employers per quarter by the risk classes for veterinary clinic worker and grooming and other services workers. Another limitation was the lack of age data on populations at risk, preventing any analysis of the effect of age on injury risk. Also, workers' compensation data are known to underreport the magnitude of occupational injury and illness [Fan et al., 2006]. Finally, the veterinary clinics and grooming and other services risk class data analyzed allow some overlap of professionals with clinical veterinary personnel found in both risk classes studied. Therefore our findings do not exclusively compare one occupational group to another across the two risk classes being compared.

Occupational hazards are prevalent among veterinary medical and animal care workers in Washington State. We found an increased claim rate in grooming and other services when compared to those in veterinary clinics. Injury types ranked similarly among the two groups though animal related injuries involved cats more commonly in the veterinary clinic workers and dogs in the grooming and other services workers. Back WMSDs were common and were caused by dogs most commonly in both groups. Reasons for the high claim rates and differences seen between the two compared animal caretaker groups is only speculative but likely involves reporting practices, and overall exposure frequency. Other external factors include the prevalence of obesity in domestic pets and facility design that places additional strain on the musculoskeletal system of workers. Employers of personnel in veterinary clinics and grooming and other services should implement enhanced occupational safety and health programs in the workplace including training, and ongoing monitoring of occupational injury hazards faced by these workers.

## AUTHORS' CONTRIBUTIONS

All authors have provided substantial contributions to either the conception or design of the work or the acquisition,

analysis, or interpretation of data for the work. All authors were involved in the drafting and/or revising of the work for important intellectual content, final approval of the version to be published, and are in agreement to be accountable for all aspects of the work.

## ACKNOWLEDGMENT

Research reported in this publication was supported by the National Institute of Environmental Health Sciences of the National Institutes of Health under award number T32ES015459.

## AUTHORS' DISCLAIMER

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

## DISCLOSURE (AUTHOR)

The authors report no conflicts of interests.

## DISCLOSURE BY AJIM EDITOR OF RECORD

Rodney Ehrlich declares that he has no competing or conflicts of interest in the review and publication decision regarding this article.

## REFERENCES

- American Veterinary Medical Association. 2012. U.S. Pet Ownership & Demographics Sourcebook. American Veterinary Medical Association. Schaumburg, IL, pgs. 214.
- Bureau of Labor Statistics, US Department of Labor. 2014. Occupational Outlook Handbook, 2014–15 Edition. "Healthcare Occupations". Available at: <http://www.bls.gov/ooh/healthcare/>. (Last accessed October 19, 2015).
- Bureau of Labor Statistics, US Department of Labor. 2012. Occupational Injury and Illness Classification Manual. Available at: <http://www.bls.gov/iif/oshciics.htm>. (Last accessed October 19, 2015).
- Bureau of Labor Statistics, US Department of Labor. 2010. Standard Occupational Classification Manual. Available at: <http://www.bls.gov/soc/>. (Last accessed October 19, 2015).
- Burns K. 2013. American Veterinary Medical Association report details pet ownership, veterinary care. *J Am Vet Med Assoc* 242: 280–285.
- Drobatz KJ, Smith G. 2003. Evaluation of risk factors for bite wounds inflicted on caregivers by dogs and cats in a veterinary teaching hospital. *J Am Vet Med Assoc* 223:312–316.
- Fan ZJ, Bonauto DK, Foley MP, Silverstein BA. 2006. Underreporting of work-related injury or illness to workers' compensation: Individual and industry factors. *J Occup Environ Med* 48:914–922.

- Fowler H, Holzbauer S, Smith K, Scheffel J. 2016. Survey of occupational hazards in Veterinary Medicine, Minnesota 2012. *J Am Vet Med Assoc* 248:207–218.
- Freiwald A, Litster A, Weng HY. 2014. Survey to investigate pet ownership and attitudes to pet care in metropolitan Chicago dog and/or cat owners. *Prev Vet Med* 115:198–204.
- Fritschi L, Day L, Shirangi A, Robertson I, Lucas M, Vizard A. 2006. Injury in Australian veterinarians. *Occup Med (Lond)* 56:199–203.
- Gabel CL, Gerberich SG. 2002. Risk factors for injury among veterinarians. *Epidemiol* 13:80–86.
- Howard N, Adams D. 2011. A look at workers' compensation injury data for pet care service professionals in Washington State. *Pet Services J* Jan/Feb 14–19.
- Washington State Department of Labor & Industries. 2014. Title 296 WAC In: Washington State Legislature.
- Hub International. 2007. Workers' compensation claim trends, a year in review. *AVMA PLIT Safety Bulletin* 2007 15:1–2.
- Jeyaretnam J, Jones H. 2000. Physical, chemical and biological hazards in veterinary practice. *Aust Vet J* 78:751–758.
- Jeyaretnam J, Jones H, Phillips M. 2000. Disease and injury among veterinarians. *Aust Vet J* 78:625–629.
- Laflamme DP. 2012. Companion animals symposium: Obesity in dogs and cats: What is wrong with being fat?. *J Anim Sci* 90:1653–1662.
- Landercasper J, Cogbill TH, Strutt PJ, Landercasper BO. 1988. Trauma and the veterinarian. *J Trauma* 28:1255–1259.
- Lucas M, Day L, Shirangi A, Fritschi L. 2009. Significant injuries in Australian veterinarians and use of safety precautions. *Occup Med (Lond)* 59:327–333.
- Nienhaus A, Skudlik C, Seidler A. 2005. Work-related accidents and occupational diseases in veterinarians and their staff. *Int Arch Occup Environ Health* 78:230–238.
- National Institute for Occupational Safety and Health editor 2013. National Occupational Research Agenda (NORA). National Healthcare And Social Assistance Agenda For Occupational Safety And Health Research And Practice In The U.S. Healthcare And Social Assistance (HCSA) Sector.
- Osborne D, Richardson F. 2006. Non-DVM staff: Doing more with more. *Can Vet J* 47:1125–1127.
- Peinecke D, Saibel C. 2013. Occupational Employment and Wage Estimates. Bureau of Labor Statistics, US Department of Labor. Available at: <https://fortress.wa.gov/esd/employmentdata/docs/occupational-reports/occupational-employment-wage-estimates-2013.pdf>. (Last accessed October 19, 2015).
- Poole AG, Shane SM, Kearney MT, McConnell DA. 1999. Survey of occupational hazards in large animal practices. *J Am Vet Med Assoc* 215:1433–1435.
- Poole AG, Shane SM, Kearney MT, Rehn W. 1998. Survey of occupational hazards in companion animal practices. *J Am Vet Med Assoc* 212:1386–1388.
- Scuffham AM, Firth EC, Stevenson MA, Legg SJ. 2010a. Tasks considered by veterinarians to cause them musculoskeletal discomfort, and suggested solutions. *N Z Vet J* 58:37–44.
- Scuffham AM, Legg SJ, Firth EC, Stevenson MA. 2010b. Prevalence and risk factors associated with musculoskeletal discomfort in New Zealand veterinarians. *Appl Ergon* 41:444–453.
- van Soest EM, Fritschi L. 2004. Occupational health risks in veterinary nursing: An exploratory study. *Aust Vet J* 82:346–350.
- Washington Administrative Code. 296-17A-7308. 2006.
- Washington Administrative Code. 296-17A-6107. 2006.
- Weese JS, Faires M. 2009. A survey of needle handling practices and needlestick injuries in veterinary technicians. *Can Vet J* 50:1278–1282.
- Wiggins P, Schenker MB, Green R, Samuels S. 1989. Prevalence of hazardous exposures in veterinary practice. *Am J Ind Med* 16:55–66.
- Wright JG, Jung S, Holman RC, Marano NN, McQuiston JH. 2008. Infection control practices and zoonotic disease risks among veterinarians in the United States. *J Am Vet Med Assoc* 232:1863–1872.

---

All work for this manuscript was conducted at the University of Washington and the Washington State Department of Labor and Industries