



UNIVERSITI PUTRA MALAYSIA

**OCCUPATIONAL HAZARDS DURING THE TEACHING AND PRACTICE
OF VETERINARY MEDICINE AT THE UNIVERSITY VETERINARY
HOSPITAL, UNIVERSITI PUTRA MALAYSIA**

KOO JIE YI

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FPV 2020 100**

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VETERINARY HOSPITAL, UNIVERSITI PUTRA MALAYSIA**

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**FACULTY OF VETERINARY MEDICINE
UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR**

2020/2021

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PRACTICE OF VETERINARY MEDICINE AT THE UNIVERSITY
VETERINARY HOSPITAL, UNIVERSITI PUTRA MALAYSIA**

KOO JIE YI

A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
In partial fulfilment of the requirement for the
DEGREE OF DOCTOR OF VETERINARY MEDICINE
Universiti Putra Malaysia
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2020/2021

CERTIFICATION

It is hereby certified that I have read this project paper entitled “Occupational hazards during the teaching and practice of veterinary medicine at the University Veterinary Hospital, Universiti Putra Malaysia” by Koo Jie Yi and in my opinion, it is satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirement for the course VPD 4999 – Final Year Project.



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The journey of completing this Final Year Project is one of the most memorable moments in my life. I enjoyed the process of making this happen, especially to step out from my comfort zone, and to accept the opportunity for me to learn, and grow. I would like to express my most sincere gratitude to my supervisor, Prof. Dr. Goh Yong Meng for his guidance, patience and encouragement throughout this project. Despite his busy schedule, he would still spend his time to have discussions with us and helped us to solve all the problems we were facing.

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To DVM 2021, life is full of ups and downs, but we got to believe that, we are not alone, and we can go through this together, to be whom we want to be in the future.

Thanks for your existence!

To all the Lecturers, Veterinary Officers and all the DVM students during academic session 2019/2020, thanks for spending your precious time answering my questionnaire and made my project a success.

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Thank you for always having my back, and letting me know that, when push comes to shove, I can always go home, to a place that is full of loves and joys.

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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 – Projek Ilmiah Tahun Akhir

BAHAYA PEKERJAAN SEMASA PENGAJARAN DAN PRAKTIK PERUBATAN VETERINAR DI HOSPITAL VETERINAR UNIVERSITI,

UNIVERSITI PUTRA MALAYSIA

Oleh

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Para pelajar dan staf dari Hospital Veterinar Universiti, Universiti Putra Malaysia (UVH-UPM), memang dijangka akan terdedah kepada pelbagai jenis bahaya pekerjaan semasa aktiviti pengajaran dan amalan perubatan veterinar. Sehubungan itu, kajian ini adalah untuk menentukan tahap risiko insiden dan jenis bahaya pekerjaan, di kalangan staf dan pelajar di UVH-UPM, Selain itu, kajian ini juga akan menentukan jika terdapat perbezaan risiko jenis bahaya pekerjaan merentas tahun pengajian pelajar Doktor Perubatan Veterinar yang terlibat. Projek ini dijalankan dengan menggunakan kaedah soal selidik, dan diajukan menggunakan aplikasi “Google Forms”. Kesemua prosedur dan soal selidik yang digunakan telah mendapat kelulusan Jawatankuasa Etika Universiti Penyelidikan Melibatkan Manusia, Universiti Putra Malaysia (JKEUPM). Data demografik, jenis bahaya di tempat kerja, jenis kecederaan dan penyakit, langkah pencegahan bahaya serta

kawalan jangkitan telah direkodkan melalui soal selidik ini. Kajian ini melibatkan 250 individu, di mana 59 orang (23.6%) adalah lelaki, dan 121 orang (48.4%) wanita di kalangan pelajar tahun klinikal. Daripada 21 pegawai veterinar yang mengambil bahagian, 7 orang (33.3%) adalah lelaki. Dapatan kajian menunjukkan kebanyakan pelajar tahun klinikal terdedah kepada bahaya pekerjaan baru-baru ini, iaitu kurang daripada 5 bulan yang lepas, apabila dibandingkan kepada pelajar tahun pra- dan para-klinikal. Bahaya kerja dengan kekerapan yang paling tinggi adalah pengambilan radiografi, atau mengekang binatang untuk radiografi (OR: 17.719, 95% CI 7.642-41.085), diikuti seterusnya oleh pengendalian disinfektan seperti alkohol dan bahan peluntur (OR: 11.853, 95% CI 6.366-22.068), dan pengendalian benda tajam seperti jarum and skalpel (OR: 9.666, 95% CI 5.183-18.026). Jenis kecederaan dan penyakit di UVH-UPM yang paling tinggi risikonya adalah kecederaan yang disebabkan oleh haiwan seperti gigitan atau calaran (OR: 9.564, 95% CI 5.007-18.614), kecederaan oleh benda tajam (OR: 4.476, 95% CI 2.579-7.766), serta risiko mendapat sakit belakang dan sakit leher (OR: 3.658, 95% CI 1.906-7.020). Dapatan projek ini telah menunjukkan bahawa pelajar dan staf veterinar terdedah kepada pelbagai jenis bahaya pekerjaan di UVH-UPM. Tambahan pula, taburan risiko bahaya perkerjaan tersebut adalah berbeza dengan beerti mengikut tahun pengajian ($P < 0.05$). Adalah didapati bahawa risiko bahaya perkerjaan adalah lebih tinggi dengan peningkatan tahun pengajian, terutamanya di kalangan pelajar klinikal.

Kata kunci: *bahaya pekerjaan, risiko, pelajar veterinar, pegawai veterinar, perubatan veterinar*

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 – Final Year Project.

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Veterinary students and veterinary staffs from University Veterinary Hospital, Universiti Putra Malaysia (UVH-UPM) are expected to be exposed to different types of occupational hazards during the teaching and practice of veterinary medicine. This study aimed to determine the incidence and types of occupational hazards of veterinarians and veterinary students at UVH-UPM are at risk of, and the possible differences in the risk of various types of occupational hazards across years of study. A cross-sectional survey was conducted using a questionnaire created through Google Forms. Data on demographics, workplace hazards, types of injuries and diseases and hazard prevention and infection control were obtained. Of 250 students recruited, 59 (23.6%) were male and 121 (48.4%) of them were from clinical year. Out of 21 veterinary officers and lecturers recruited, 7 (33.3%) of them were male. Most of the clinical year students were exposed to the hazards more recently which is less than 5 months ago compared to pre- and para-clinical

students. Hazards with highest frequency of exposure are taking radiograph and restraining animal for radiograph (OR: 17.719, 95% CI 7.642-41.085), followed by handling disinfectants such as alcohol, bleach (OR: 11.853, 95% CI 6.366-22.068) and handling sharps such as needle, scalpel blade (OR: 9.666, 95% CI 5.183-18.026). The types of injuries and diseases at UVH-UPM with highest risk were animal induced injury such as bites or scratches (OR: 9.654, 95% CI 5.007-18.614), needle-stick or scalpel blade injuries (OR: 4.476, 95% CI 2.579-7.766) and back or neck pain (OR: 3.658, 95% CI 1.906-7.020). This study revealed that students and staffs were exposed to different types of occupational hazards at UVH-UPM and the types of risks associated to each hazard differed across year of study. The risk of occupational hazards increases when students are in their clinical years.

Keywords: *occupational hazards, risks, veterinary students, veterinarians, veterinary medicine*

1.0 INTRODUCTION

Hazard is defined as a source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these. (Department of Occupational Safety and Health (DOSH), Ministry of Human Resources, Malaysia). Therefore, occupational hazard means a hazard experienced in the workplace or a result of doing their jobs. Veterinarians are believed to have higher exposure to variety of occupational hazards and at higher risk to have work-related injuries or diseases. (Nienhaus *et al.*, 2005).

Occupational hazards among veterinarians can be classified into biological hazards, physical hazards, chemical hazards, ergonomic hazards and psychological hazards. (Bonini *et al.*, 2016) Mostly, physical hazard had the highest risk in causing animal-induced injuries or sharp injuries. (Fowler *et al.*, 2012) However, psychological hazard is now having an emerging risk among veterinarians and becoming increasingly significant. (Bonini *et al.*, 2016)

The current study represents a pilot effort to investigate and determine occupational hazards veterinarians and veterinary students are exposed to during practice in Malaysia. This study aimed to determine the incidence and types of occupational hazards of veterinarians and veterinary students at University Veterinary Hospital (UVH) are at risk of and to determine the possible differences in the risk of various types of occupational hazards across year of study. This information is crucial in developing an effective organizational preventative and control plan against potential hazards among personnel at UVH.

2.0 LITERATURE REVIEW

2.1 OCCUPATIONAL HAZARDS

Hazard means a source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these according to the Guidelines for Hazard Identification, Risk Assessment and Risk Control (HIRARC) under Department of Occupational Safety and Health (DOSH), Ministry of Human Resources, Malaysia. Therefore, “Occupational Hazards” means a hazard experienced in the workplace or a result of doing their job. Occupational hazards associated with veterinary practice is an issue of interest across the globe, and several epidemiological studies have been published on occupational hazards among veterinary professionals across the countries.

2.2 TYPES OF OCCUPATIONAL HAZARDS

Occupational hazards are being classified into several types according to the nature of the hazards which are 1. Physical Hazards, 2. Chemical Hazards, 3. Biological Hazards, 4. Ergonomic Hazards and 5. Psychological Hazards. (Volquind *et al.*, 2012)

2.2.1 PHYSICAL HAZARDS

Physical hazards are hazards that constitute a threat of physical harm to individuals that involve animal or equipment-related injuries in addition to radiation exposures and needle stick and sharp injuries. (Fowler *et al.*, 2016). Physical hazards also include musculoskeletal disease (MSDs) such as sprains, strain or any other types of injuries to bones, tendons, muscles, ligaments, soft

tissue and nerves. (Joshua & Karkada, 2017). Some common physical hazards in veterinary field are animal handling and restraint hazards, heat stress, noise hazards, slips, trips and falls. (CDC, 2018)

2.2.2 CHEMICAL HAZARDS

Chemical hazards are chemical substances that have the ability to cause physical or health hazards. Chemical hazardous substances may be, but are not limited to being explosive, toxic, self-reactive, flammable, oxidizing or corrosive. The routes of exposure are inhalation, dermal absorption or ingestion. (CDC, 2018) Chemical hazards include contact with chemotherapy or antineoplastic drugs, hormones, pesticides, disinfectant and anaesthetic gases which may pose mild to severe hazards to the handlers. Certain health risks that occur due to exposure to chemical hazards are birth defects due anaesthetic gases of chemotherapeutic agents, cancer due to antineoplastic drugs as well as allergies due to disinfectants or pesticides. (Joshua & Karkada, 2017)

2.2.3 BIOLOGICAL HAZARDS

Biological hazards also known as biohazards, which refer to biological substances that pose a threat to the health of living organisms, particularly humans. (Shroder & Sivanpillai, 2016). Biological hazards consist of zoonotic diseases and other infectious agents such as bacterial and viral pathogens. (Scheftel *et al.*, 2017). The possible routes of transmission include aerosol, oral or ingestion, droplet spray, direct and indirect contact or vector borne. (CDC, 2018) Some common zoonotic disease exposed to veterinarians based on a study in 2012 included ringworm or dermatophytosis, rabies and methicillin-resistant *Staphylococcus aureus*. (Epp &

Waldner, 2012). Allergic reaction towards animals' fur, hair or semen is another form of biological hazards as well. (Jeyaretnam *et al.*, 2017).

2.2.4 ERGONOMIC HAZARDS

Ergonomics or human factors is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. (International Ergonomics Association, 2015) Several ergonomics risk factor includes awkward posture, forceful and sustained exertions, repetitive motion, static and sustained posture. (Ismail, 2019). Some of the veterinary procedures associated with pain among veterinarians include rectal palpation, dentistry (Equine and small animal), long hour surgery, ultrasound examinations and large animal obstetrics, where long hours and repetitive movements are norms (White, 2020).

2.2.5 PSYCHOLOGICAL HAZARAD

Psychological hazards are hazards in the work environment and the way the work is organized that are associated with mental disorders and/or physical injury or illness. Types of psychological hazards in veterinary practice can be classified into several categories which include workload-related stress, staff-related stress, client-related stress, burglary-related stress and others. (Epp & Waldner, 2012) Certain forms of hostility at work consists of social exclusion of employees, yelling, bullying, throwing of items, threats and physical violence. (Fowler *et al.*, 2012). Some consequences of exposures to psychological hazards

at workplace in veterinary practice leads to suicidal behaviour and psychosocial problems among veterinarians. (Platt *et al.*, 2010)

2.3 DISEASE EXPOSURE AND INJURIES AMONG VETERINARIANS

Work-related injuries among veterinarians included animal-related injuries, motor vehicle accidents when travelling for work purpose, falls, needle-sticks and foreign bodies in eyes and ears. (Lucas *et al.*, 2009). Veterinarians are at high risk to have several traumatic injuries during their practice as veterinarians work closely with animals, often performing procedures that may lead to animal to in pain or distress. (Fritschi *et al.*, 2006). Veterinarians also interact with a wide variety of animal species which carry occupational hazards and risk injury. (Khillare & Bhave, 2018). This requires veterinarians to physically restrain the animals while performing physical examination. As most of the animals are large and heavy, or capable of biting, kicking or scratching in response to the handling. (Fritschi *et al.*, 2006). Veterinarians always sustain animal-related injuries and some may have led to hospitalisation. (Nienhaus *et al.*, 2004). The animal causing the accident depends on type of veterinary practice. Cows and horses are believed to be more dominant in large animal practices and dogs and cats prevails the cause of accidents in small animal practices. (Nienhaus *et al.*, 2004)

Diseases that commonly occurred among veterinarians are related to zoonotic disease, allergic reaction which leads to respiratory symptoms or allergic contact dermatitis, musculoskeletal disorders or certain mental health problems. (Nienhaus *et al.*, 2004; Platt *et al.*, 2010)) Zoonotic diseases are a great health concern in veterinary practice (Weber & Rutala 1999; Jeyaretnam & Jones 2000;

Weese *et al.*, 2002). Zoonotic disease in small animal practice are often overlooked. (Weese, *et al.*, 2002). Some reported zoonotic diseases in western Canada includes Bartonellosis, Brucellosis, Rabies, Ringworm, Giardiasis (Epp & Waldner, 2012). Several allergies such as cat, dog, guinea pig, rabbit and deer hair will lead to symptoms such as sneezing, hay fever, swollen face, swollen eyes and dermatitis. (Jeyaretnam *et al.*, 2000). Some mental health problems are depression, anxiety and psychological distress. (Platt *et al.*, 2010)

2.4 HAZARD PREVENTION AND INFECTION CONTROL

In order to ensure the health of the animal, veterinarians are required to put their own health at risk while discharging their duties. As veterinarians are exposed to a variety of work-related health risks (Nienhaus *et al.*, 2005), preventive and control measure is important in order to reduce the risk. It is shown that an effective safety and health programs (also known as injury and illness prevention programs) can help to reduce workplace injuries and diseases and associated cost. (CDC, 2018). Therefore, employers should provide a safe and healthy working environment to all their employees. For instance, provide adequate training, appropriate machinery, protective clothing and equipment with proper supervision are important elements in any workplace. (Jeyaratnam *et al.*, 2000). Employers should develop a comprehensive written safety and health program that consists of the key elements such as i. management leadership, ii. Worker participation, iii. Hazard identification and assessment, iv. Hazard prevention and control, v. education and training, vi, program evaluation and improvement and vii.

Communication and coordination for host employers, contractors, and staffing agencies. (CDC, 2018)

Some control measures to ensure occupational safety among veterinarians are prevention through design process, for example design and construction of animal handling or anaesthetic gas control system. (Khillare & Bhawe, 2018). Next, is through personal protection which is the usage of Personal Protective Equipment (PPE) such as gloves, face masks and face shields, or appropriate shoes cover. (Babeiker, 2008). Vaccination is essential in controlling and preventing certain zoonotic disease among veterinarians. (Jakraya, 2018). Rabies Pre-exposure vaccine should be administered among all practicing veterinarians as exposures to rabies is relatively high among veterinarians. The awareness in addressing prevention and control of occupational hazards by developing and implementing improved handling practices and safety precautions need to be raised among veterinarians in order to ensure occupational safety. (Nigam & Srivastav, 2011)

2.5 FACTORS THAT INFLUENCED THE RISKS OF EXPOSURE TO HAZARDS

YEARS OF PRACTICE

The difference in year of practices results in different exposure to occupational hazards. Veterinarians with fewer year of practice are believed to take more X-ray and have higher exposure to anaesthetics gases as compared to veterinarians with higher year of practices. (Fritschi *et al.*, 2007) There was a study showed that recent graduates had the higher usage of protective practices compared to earlier graduates, which help in reducing the risk of exposure of

hazards. (Fritschi *et al.*, 2007) Veterinarians with more years of experience were believed to be less likely to report zoonoses or injuries due to bites or scratches as they have more experience in animal handling. (Epp & Waldner, 2012)

FIELDS OF PRACTICE

The fields of practice among veterinarians can be classified into small animal practice, large animal practice or mixed practice. It is believed that injury rates are often higher for veterinarians that work with large animals; however, interaction with small animals will also result in minor injuries. (Epp & Waldner, 2012). In another study in Australia, majority of significant injuries occurred in farms and large animals accounted >40% of reported significant injuries. (Lucas *et al.*, 2009). The exposure to chemical substances will be different among fields of practice as well. It was shown in previous study that stated veterinarians who deal with large animal species were more likely to use preservatives, pesticides and drugs for reproduction; while veterinarians who did not work with large animals were more likely to handle cytotoxic drugs. (Epp & Waldner, 2012)

GENDER

The gender is one of the factors which influence the risk of exposure to the hazards as pregnant women often have higher risk in affecting their reproductive health. (Fowler *et al.*, 2012) Pregnant women who are exposed to ionising radiation would increase spontaneous abortion among female veterinarians. (Shirangi *et al.*, 2007) Besides, injury rates among females are higher compared to males. (Epp & Waldner, 2012) This is due to lesser strength of women compared to men, and which lead to difficulty in restraining animals and eventually lead to injuries.

(Klesh & Sahl, 1996). However, another study found that there was higher prevalence of males reported injuries especially horse-related injuries. (Lucas *et al.*, 2009)

3.0 MATERIALS AND METHODS

The study was conducted on 250 DVM students and 21 Veterinary officers or lecturers that had been admitted to the study between August to September 2020.

The inclusion criteria for the respondents were as follows:

1. Undergraduate students from Faculty of Veterinary Medicine during academic session 2019/2020.
2. Veterinary Officers from the Department of Companion Animal Medicine and Surgery and the Department of Large Animal and Exotic, University Veterinary Hospital, and have been working for more than 12 months at the point of the commencement of this study.
3. Lecturers from Department of Veterinary Clinical Studies, Faculty of Veterinary Medicine.

This study was approved by JKEUPM with the approval number of JKEUPM-2020-187. (Appendix I)

3.1 THE QUESTIONNAIRE

The questionnaire was adapted from a few researches on Workplace Hazards by NIOSH, CDC, Institute for Work and Health, Canada and study on Types of Injuries and Disease (Epp & Waldner, 2012). A sample questionnaire

used for the current study is attached in appendix II. There are 5 sections included in this questionnaire as follows:

1. Part A: Consent declaration
2. Part B: Demographic Information
3. Part C: Workplace Hazards
4. Part D: Types of Injuries and Diseases
5. Part E: Hazard Prevention and Infection Control

3.2 DATA COLLECTION

A questionnaire was created using Google Form the link was then being sent to the targeted respondents which are the DVM students and Veterinary Practitioners at UVH by verbal notice, *WhatsApp* application or E-mail. Selected respondents could fill in the questionnaires through the link given within 3 weeks. The questionnaire will be submitted once the respondents finish answering the question.

3.3 DATA ANALYSIS

The data was being analysed using SPSS version 25.0 (IBM Corp, Armonk, New York, USA). The survey responses were being grouped into two categories which are DVM students and Veterinary Practitioners. Descriptive statistics were computed, and data are presented as frequency and percentage. Risk analysis of each types of occupational hazards and type of injuries and diseases were performed. All statistical analysis was performed at 95% confidence level.

4.0 RESULTS

4.1 DEMOGRAPHIC INFORMATION

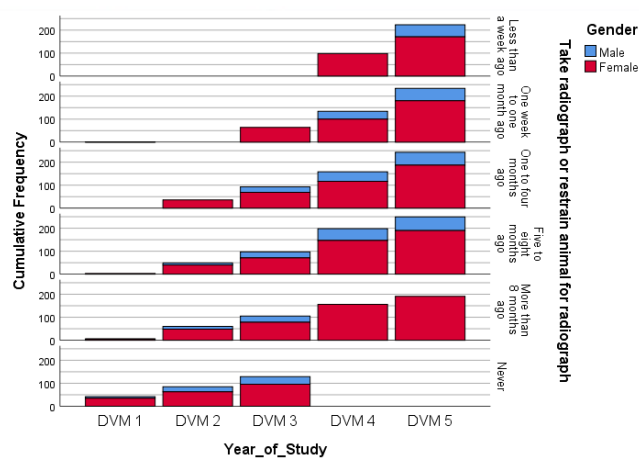
The survey population that is possible to be included in this study comprised of 523 veterinary students, and 218 staff members of the Faculty of Veterinary Medicine for the period between August to September 2020. Therefore the current study covered 33.7% of the Faculty's population. Five hundred questionnaires were sent out to students, of which only 250 responses are recorded, amounting to a response rate of 50% (250/500). Out of the 250 respondents among veterinary students, 23.6% (59/250) were male and 76.4% (191/250) were female. The percentage of respondents for DVM 1, DVM 2, DVM 3, DVM 4 and DVM 5 were 16.8% (42/250), 17.2% (43/250), 17.6% (44/250), 31.2% (78/250) and 17.2% (43/250) respectively. DVM 1, DVM 2 and DVM 3 students were being classified under Pre and Para-Clinical Year students, which consisted of 51.6% (129/250) while DVM 4 and DVM 5 were classified as Clinical Year Students, which consisted of 48.4% (121/250).

Out of 37 questionnaires that being sent out to veterinary officers and lecturers from the Department of Companion Animal Medicine and Surgery, Department of Farm and Exotic Animals Medicine and Surgery and the Department of Veterinary Clinical Studies, 21 responses were received with a response rate of 56.8%. From the 21 responses, 33.3% (7/21) were male and 66.7% (14/21) were female. 38.1% (8/21) were from Department of Companion Animal Medicine and Surgery, 28.6% (6/21) were from Department of Farm and Exotic Animal Medicine and Surgery and 33.3% (7/21) of them were from Department

of Veterinary Clinical Studies. The percentage of year of practice between 1-5 years, 6 to 10 years and more than 10 years were 33.3% (7/21), 38.1% (8/21) and 28.6% (6/21) respectively.

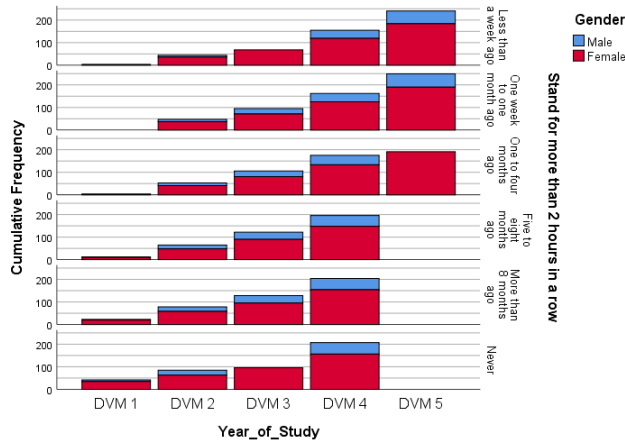
4.2 LAST EXPOSURE TO HAZARDS

Figure 1: Cumulative frequency of Last exposure to taking radiograph or restraining animal for radiograph against year of study



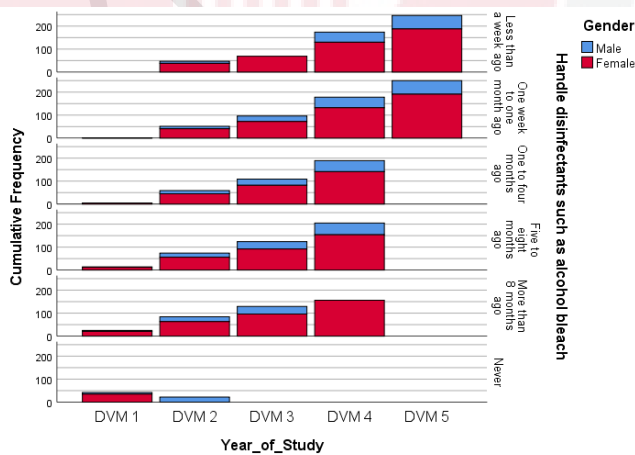
From *Figure 1*, the cumulative frequency of last exposure to radiograph taking, or restraining animal for radiograph up to more than 8 months ago, was noted to increase from DVM 1 to DVM 5. Only students from DVM 4 and 5 had the most recent exposure which was less than a week ago. However, those who never exposed to this hazard only consist of students from DVM 1 to DVM 3. This graph shows that clinical year students had more recent exposure to this hazard, compared to pre and para-clinical year students.

Figure 2: Cumulative frequency of Last exposure to standing for more than 2 hours in a row against year of study



From Figure 2, it shows that DVM 5 students recorded the highest frequency of standing for more than 2 hours within the last 4 months. Students in their clinical years are noted to be more at risk of being exposed to longer standing hours at increasing frequency.

Figure 3: Cumulative frequency of Last exposure to handling disinfectants such as alcohol and bleach against year of study



From Figure 3, almost all respondents handled disinfectants such as alcohol and bleach during the past 12 months, except a few pre-clinical year students. All DVM 5 students reported handling of disinfectants less than a month ago.

4.3 LIKELIHOOD OF EXPOSURE TO OCCUPATIONAL HAZARDS AT UVH

Table 1: Likelihood of Exposure of Hazards between Clinical students versus Pre and Para-clinical students

Exposure of Hazards	Odds Ratio for Clinical year students vs Pre and Para-clinical year students
Take radiograph or restrain animal for radiograph	17.719 (95% CI 7.642-41.085)*
Handle disinfectants such as alcohol, bleach	11.853 (95% CI 6.366-22.068)*
Handle sharps such as needle, scalpel blade etc.	9.666 (95% CI 5.183-18.026)*
Usage of anaesthetics gases	8.643 (95% CI 3.861-19.345)*
Handle animal with zoonotic disease	7.895 (95% CI 3.651-17.071)*
Stand for more than 2 hours in a row	7.129 (95% CI 4.064-12.505)*
Work in noise environment such as dog barks, piglet screaming, machinery noise	5.654 (95% CI 3.284-9.735)*
Handle pesticides or ectoparasiticides	4.806 (95% CI 2.542-9.088)*
Work in dusty environment	4.733 (95% CI 2.777-8.203)*
Handle hazardous drug such as antineoplastic drugs, hormone and vaccines	4.332 (95% CI 2.285-8.210)*
Manually lift, carry or push items heavier than 20kg	4.028 (95% CI 2.280-7.116)*
Work in a bent, twisted or awkward posture	3.922 (95% CI 2.286-6.731)*
Work in an extreme temperature environment or long hour of sun exposure	3.519 (95% CI 2.083-5.945)*
Feel little interest or pleasure in doing things	2.541 (95% CI 1.416-4.559)*

**Significant result*

The result from the table showed that clinical year students that consist of DVM 4 and DVM 5, were more likely to have higher frequency of exposure to all the hazards compared to pre and para-clinical year students which consists of DVM 1, DVM 2 and DVM 3 students. The study revealed that students in their clinical years were 17.1 times more likely to be exposed to hazards associated with radiographic exposure when taking radiograph or restraining animal for

radiograph; almost 12 times more likely to be exposed to hazards associated with disinfectants such as bleach and alcohol usage; 9.7 times more likely to be associated with hazards during handling needles and scalpel blades; 8.6 times more likely to be exposed to hazards of anaesthetic gases, and around 8 times more likely to be exposed to hazards associated with zoonotic disease while handling patients, as compared to students that were not in their clinical years. Details of the odds ratio are as depicted in *Table 1*.

4.4 TYPES OF INJURIES AND DISEASES AT UVH

Table 2: Odds of Injuries and Diseases between Clinical year students vs Pre and para-clinical year students

Injuries and Diseases	Odds ratio for Clinical Year students versus Pre and para-clinical Year students
Animal induced injury (Bites or scratches)	9.654 (95% CI 5.007-18.614)*
Needle stick or scalpel blade injury	4.476 (95% CI 2.579-7.766)*
Back or neck pain	3.658 (95% CI 1.906-7.020)*
Allergic reaction due to animal's fur or hair	2.886 (95% CI 1.646-5.060)*
Depression	2.463 (95% CI 1.391-4.362)*
Crushed or kicked by animals	2.443 (95% CI 1.428-4.179)*
Allergic reaction due to chemical substances such as latex gloves, pesticides or disinfectants	2.330 (95% CI 1.004-5.410)*
Anxiety	2.172 (95% CI 1.310-3.600)*
Hearing loss	3.254 (95% CI 0.334-31.719)
Infected with zoonotic disease	2.973 (95% CI 0.770-11.481)
Slips, Trips or Fall	1.599 (95% CI 0.946-2.571)
Muscle sprains, strains or tear	1.562 (95% CI 0.948-2.573)
Sunburnt	1.469 (95% CI 0.886-2.435)

**Significant result*

From *Table 2*, clinical year students were more likely to experience injuries or diseases such as needle stick or scalpel blade injury (4.476; 95% CI 2.579-7.766), animal induced injury (Bites or scratches) (9.654; 95% CI 5.007-18.614), crushed

or kicked by animals (2.443; 95% CI 1.428-4.179), back or neck pain (3.658; 95% CI 1.906-7.020), allergic reaction due to animal's fur or hair (2.886; 95% CI 1.646-5.060), allergic reaction due to chemical substances such as latex gloves, pesticides or disinfectants (2.330; 95% CI 1.004-5.410), depression (2.463; 95% CI 1.391-4.362) and anxiety (2.172; 95% CI 1.310-3.600). It was found that students in their clinical years were almost 10 times more likely to get bitten or scratches from animals; 4.5 times more likely to get needle-stick or scalpel blade injuries; around 4 times more likely to experience back or neck pain and develop allergic reaction towards animal's fur and hair, and almost 3 times more likely to have depression compared to students that were not in their clinical years.

4.5 HAZARDS PREVENTION AND INFECTION CONTROL AT UVH

Table 3: Frequency of Agreement of Students, Veterinary Officers and Lecturers to Preventative Measure provided by UVH

Preventative Measure	Frequency of answering "Yes"	
	% Student (No.)	%VOs and Lecturers (No.)
Comply with the Guidelines on the Handling and Management of Clinical Wastes in Malaysia such as proper veterinary waste management and disposal	98.0% (245/250)	85.7% (18/21)
Consider safety in the design of processes such as animal restraint and anaesthetic gas control system	95.6% (239/250)	76.2% (16/21)
Promote safe work habits such as wearing appropriate PPE	94.4% (236/250)	95.2% (20/21)
Ensure that the equipment is maintained and operated safely.	92.8% (232/250)	61.9% (13/21)
Inform all workers and students about potential workplace hazards	92.4% (231/250)	71.4% (15/21)

Consider safety in design and construction of animal handling, restraint, housing and other veterinary facilities	92.4% (231/250)	71.4% (15/21)
Comply with Occupational Safety and Health Act 1994	92.0% (230/250)	66.7% (14/21)
Develop and implement a comprehensive written workplace-specific safety and health program	86.0% (215/250)	52.4% (11/21)
Have a medical surveillance system in place and record report work-related injuries and illnesses	74.8% (187/250)	47.6% (10/21)
Review and update the written safety and health program periodically	72.8% (182/250)	33.3% (7/21)
Document and maintain staff/student records of training, immunizations and work-related injuries and illness	70.0% (175/250)	33.3% (7/21)

Overall, the current study showed that relatively high proportion of students agreed that the UVH implemented the necessary preventative measures as described in *Table 3* above, compared to veterinary officers and lecturers. Up to 70% or more of the students had a perception that the preventative measures are being conducted or provided at UVH. However, among lecturers and Veterinary Officers from UVH, their perceptions were slightly different as most of them were not satisfied with the preventative measure provided by UVH. Nevertheless, there is a similar trend between veterinary students and lecturers and Veterinary Officers as the four preventative measure with the lowest percentage of agreement for both groups are the same. Only 86% of students and 52.4% of lecturers or veterinary officers agreed that UVH developed and implemented a comprehensive written workplace specific safety and health program. 74.8% of students and 47.6% of lecturers or VOs agreed that UVH has a medical surveillance system in place and

reports work-related injuries and illness. There was only 72.8% of students and 33.3% of lecturers and VOs thought that UVH reviews and updates the written safety and health program periodically. Lastly, only 70.0% of students and 33.3% of lecturers and VOs agreed that UVH documents and maintains students or staffs records of training, immunizations and work-related injuries and illnesses.



5.0 DISCUSSION

5.1 LAST EXPOSURE TO HAZARDS

This study acknowledged the limitations that the data were collected retrospectively and required respondents to recall events that already occurred in the past 12 months. Due to the Movement Control Order (MCO) that was being enforced since March 2020, most students from DVM 1 to DVM 3 had the last exposure to the hazards more than 5 months ago before the current study. Only DVM 4 and DVM 5 students were allowed to resume the rotation at the UVH, and to carry out their respective Final Year Project from July to August onwards. Therefore, the exposure to all the hazards were much more recent compared to students from DVM 1 to DVM 3 who were still subjected to remote learning. However, even without the influence of the MCO, clinical year students were expected to have more recent exposure to the hazards above as clinical year students will be having rotations at UVH at least once a week.

5.2 LIKELIHOOD OF EXPOSURE TO HAZARDS AT UVH

For all the hazards present at UVH, clinical year students from DVM 4 and DVM 5 were more likely to expose to the hazards as they were the proportion of students who spent more time at UVH due to their rotation compared to pre and para-clinical year students. The hazards with highest likelihood of exposure was taking radiograph or restraining animal for radiograph. This may be due to the high case load at UVH that required diagnostic imaging as one of the diagnosis methods. Therefore, clinical year students may have to attend a lot of cases that requires taking radiograph in a day during their rotation, which caused them to have a

perception that they were frequently exposed to X-ray during the past 12 months. Furthermore, other than students from DVM 3 who need to attend Diagnostic Imaging classes, almost all students from pre-clinical years never involved in the taking of radiograph, or restraining animals for radiography.

The next hazard with second highest likelihood of exposure was handling disinfectants such as bleach and alcohol. This may be subsequent to the current Coronavirus Disease (COVID-19) pandemic situation. A new Standard Operating Procedure (SOP) was being implemented at the UVH which encouraged students and staffs to disinfect their hands more frequently. Besides, UVH had a very good biosecurity measure especially at the quarantine unit of Companion Animal Ward. Bleaching is compulsory for all the cleaning procedures at the Quarantine Unit. For instance, bleach is added to the foot-dip solution and table spray at the Quarantine Unit. Therefore, handling of disinfectants had the second highest likelihood of exposure among students in their clinical years.

Handling of sharps such as needle, scalpel blades, hoof knives and others were also more common among clinical year students compared to pre and para-clinical year students. This was because a lot of veterinary procedures require the usage of sharps especially needle for administration of drugs or vaccine parenterally. Clinical year students also need to attend surgery classes which eventually increase their exposure to sharps such as scalpel blade and suturing needle.

Clinical year students were also more likely to be exposed to anaesthetic gases compared to pre- and para-clinical year students. This was so as clinical year students had higher chances to work in the main operation theatre during their

surgery and anaesthetic rotations. Besides, for most of the pre and para-clinical year students, they were expected to have zero experience of handling anaesthetic gases.

Other hazards that was concerning was handling animal with zoonotic disease. Zoonotic diseases such as dermatophytosis, sporotrichosis, salmonellosis, tuberculosis and so on were among the most common diseases carried by animals presented to UVH. Therefore, clinical year students who had the higher frequency of exposure in handling animal with zoonotic disease are believed to have higher risk to be infected.

There was no significant result shown from the data from Veterinary Officers and Lecturers from UVH. This was most likely because there was a small number of respondents which was only 21 of them. Besides, the number of veterinary officers or lecturers in each field of practices was uneven, where most of them involved in small animal practice. Moreover, among lecturers, it was difficult to group them into specific fields of practice as some of them handling more than only one species. However, it is still undeniable that staffs and lecturers from UVH are at risk of exposure to all the hazards stated above, regardless of their fields of practice. (Epp & Waldner, 2012)

5.3 ODDS RATIO OF INJURIES AND DISEASES AT UVH

By comparing between clinical year and pre- and para-clinical year students, animal related injuries such as bites and scratches had the highest odds among all injuries and diseases due to different types of hazards. This result was consistent with other previous studies from other countries (Epp & Waldner, 2012;

Poole *et al.*, 1998; Lucas *et al.*, 2009; Jeyaretnam *et al.*, 2000) Bites and scratches by animals may then lead to severe secondary infection or transmission of zoonotic diseases such as cat-scratched disease or rabies. (Hill *et al.*, 1998) Lacking skill and experience of restraining animal among students, which may induce stress on the animals, are one of the common factor that causes animals to bite or scratch. Animal bites or scratches are most likely due to their unpredictable behaviour during the physical examination and the administration of drugs or vaccines. In some previous studies, bites and scratches are more likely to happen among companion animal veterinarians. (Jeyaretnam *et al.*, 2000).

The injuries or diseases with second highest risk was due to sharps such as needle-stick and scalpel blade. Some other studies with similar findings also showed that sharp injuries were among the most common in veterinary practices. (Epp & Waldner, 2012). The consequences of needle-stick injuries include self-injecting drugs or other harmful substances, which may result in allergic reaction or more severe sequelae. (Epp & Waldner, 2012; Weese & Faires, 2009) The causes of the high risk of this injury was most likely due to act where most of students recapped needle after use, when sharp bins were not available around them, or limited number of sharp bins can be found around UVH. The habit of recapping needles when there was no needle disposal boxes available was the most common reason which caused the high rate of incidence of sharps injuries among veterinarian. (Hill *et al.*, 1998; Fowler *et al.*, 2012)

The next category of injuries or diseases with third highest risk at the UVH was back or neck pain. This result was consistent with previous study whereby up to 98% of practicing veterinarians have reported to have back pain, neck pain or

both during the year 2004-2009. (Asadi *et al.*, 2017). The consequences of having Musculoskeletal Discomfort (MSDs) such as back or neck pain is most likely due to lifting heavy objects, awkward postures and repetitive motion during veterinary procedures, especially during long hour of surgical procedure. (Fowler *et al.*, 2012) Besides, most of the examination tables in the consultation room of UVH were not adjustable, and therefore it may not be the best design for every personnel using the table due to differences of their heights. Other than due to biomechanical factor, pain may be influenced by psychosocial factors such as heavy workload or life stress. (Sara & White, 2020)

Clinical year students also had a higher risk in developing allergic reaction to animals' fur and hair. This was consistent with a study from the Netherlands whereby prevalence of allergic symptoms increased with elevated years of study, proposing that contact with animal is a risk factor to develop symptoms. (Samadi *et al.*, 2011). According to Seward, (2009), allergic reaction to animals is a significant occupational health concern for veterinarians. In veterinary practice, respiratory symptoms or allergic contact dermatitis due to animal hair, dandruff or feathers were proved to be the most frequent cause of all verified occupational diseases. (Nienhaus *et al.*, 2005)

Another concerning disease due to occupational hazards at UVH was depression. Clinical year students were more likely to experience depression as they were more stressful. Depression was believed to be caused by chronic and untreated stress. (Howard, 2017). Veterinary education was an intensive professional training program with a heavy workload and continuously demand on private time. (Collins & Foote, 2015). Veterinary education also had a relatively

high tendency in causing students to feel overwhelmed and chronically pressured. (Collins & Foote, 2015) Students in their clinical years were assumed to have more clinical responsibility such as involvement in rotations, and also consequent challenges and stressors like patient death, and managing difficult clients. (Killinger *et al.*, 2017). This large number of potential stressors would put veterinarians and students at high risk of mental, physical and mental fatigue. (Collins & Foote, 2015)

5.4 PREVENTION AND CONTROL OF HAZARDS AT THE UVH

Based on the survey, a large proportion of them agreed that UVH provided the preventative measure mentioned in the questionnaire. However, this result contradicted with lecturers and veterinary officers' perception. This was most likely due to most of the students did not fully understand the questionnaire as they may never exposed to certain terms or phrases mentioned in the questionnaire.

Nevertheless, a better preventative measure to reduce the risks of different occupational hazards should be implemented. This is because the result from this study showed that clinical year students had relatively higher risk to encounter certain injuries or diseases compared to pre- and para-clinical year students. According to Lucas *et al.*, (2009), almost half of the significant injuries occurred was due to the absence of safety precaution used. Inadequacy in protectiveness or effectiveness of intervention of the safety precaution will also lead to injuries among veterinarian.

Therefore, UVH should always provide adequate training, appropriate machinery, protective clothing and equipment with proper supervision in the workplace. UVH should also ensure the health and safety of not only the employees but also the students. (Mathews, 1993)

In addition, UVH should pay attention to the mental health of the staffs and also students. A study in the United States revealed that male veterinarians were 2.1 times and female veterinarians were 3.5 as likely as the general US population to die by suicide. (Tomasi *et al.*, 2019) UVH should always consider the workloads, working hours, and the working environment provided to the employees and students. Even though a certain amount of stress can enhance learning in students, excessive stress can always negatively affect cognitive functioning and learning through reducing concentration, decreasing attention and reducing students' ability to establish good relationship in patients. (Howards, 2017)

6.0 CONCLUSIONS

In conclusion, both students and staffs at UVH were exposed to different types of occupational hazards at UVH, even though the frequency of exposure and risk of occupational hazards differed across years of study. The risk of occupational hazards increased when the students were in their clinical years. Veterinary students at the UVH had the highest likelihood to be exposed to hazards associated with radiography taking, handling of disinfectants and handling of sharps. It was shown that physical hazards contributed to the highest risks of injuries such as animal bites or scratches, needle-stick and sharps injuries to veterinary students and veterinarians at UVH. However, biological hazards and psychological hazards should be a concern too as they will eventually lead to a severe consequence. A better preventative measure should be implemented in order to reduce the risks of occupational hazards among DVM students and staffs that are working at UVH. As part of the process of education, UVH have the responsibility to be aware of the difficulties of the staffs and students are facing and help them to cope as best they can. Furthermore, as a veterinary students of veterinary practitioners, we should never ignore our own needs and fail to set healthy limits on our commitment to work, even though veterinary practitioners are obliged to be “helpers” of others by treating the patients and fulfilling the emotional needs of the clients. Only by taking care and protecting ourselves, not only physically but also mentally, we can provide a better care to all the lovely animals.

7.0 RECOMMENDATIONS

This study was mainly focusing on assessing the occupational hazards among DVM students at UVH. This study provided an evaluation of students' level of risks at the UVH and the risks of student exposure to hazards varied based on year of study. Therefore, it is recommended that UVH should review the protocol of providing clinical training and provide compulsory safety standards such as immunizations, training in health and safety, and implement potential workplace hazards in the veterinary curriculum. UVH should develop risk assessment plans, health and safety guidelines, document and maintain students and staffs records of work-related injuries in order to reduce workplace hazards at the UVH.

In this study, the risk of exposure to hazards was being evaluated based on year of study among students only through questionnaire. Therefore, different types of study could be designed such as through interviews, reviewing surveillance report of accidents happened at the UVH to profile hazards in veterinarians by disciplines, species of practices, in-house practice environment versus field practice environment. This study could also be expanded by involving other staffs such as clerical staffs, admin staffs, drivers, cleaners etc.

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2. Gender:

[] Male

[] Female

3. Year of Practice:

[] 1 – 5 years

[] 6 – 10 years

[] >10 years

SECTION C: WORKPLACE HAZARDS

This section asks about the type of health or safety hazards that you might be exposed to in your job. Kindly recall the incidence that you have been exposed to during the past 12 months.

1. During the teaching or practice of veterinary medicine, when was the last time you feel you have been exposed to the hazards below?

**Select only one per row*

Hazards	Less than a week ago	One week to one month ago	One to four months ago	Five to eight months ago	More than 8 months ago	Never
Handle sharps such as needle, scalpel blade etc.						
Work in noise environment such as dog barks, piglet screaming, machinery noises						
Take radiograph or restrain animal for radiograph						
Work in an extreme temperature environment, or long hour of sun exposure						
Manually lift, carry or push items heavier than 20kg						
Work in a bent, twisted or awkward posture						

Stand for more than 2 hours in a row						
Handle disinfectants such as alcohol, bleach						
Handle hazardous drug such as antineoplastic drugs, hormones or vaccines						
Handle pesticides or ectoparasiticides						
Usage of anaesthetic gases						
Work in dusty environment						
Handle animal with zoonotic disease						
Feel little interest or pleasure in doing things						

2. During the teaching and practice of veterinary medicine, how often did you... for the past 12 months?

**Select only one per row*

Hazards	Never	1-11 times (Rarely)	12 – 51 times (Sometimes)	52 – 300 times (Often)	>300 times (Always)
Handle sharps such as needle, scalpel blade etc.					
Work in noise environment such as dog barks, piglet screaming, machinery noises					
Take radiograph or restrain animal for radiograph					
Work in an extreme temperature environment, or long hour of sun exposure					
Manually lift, carry or push items heavier than 20kg					

Work in a bent, twisted or awkward posture					
Stand for more than 2 hours in a row					
Handle disinfectants such as alcohol, bleach					
Handle hazardous drug such as antineoplastic drugs, hormones or vaccines					
Handle pesticides or ectoparasiticides					
Usage of anaesthetic gases					
Work in dusty environment					
Handle animal with zoonotic disease					
Feel little interest or pleasure in doing things					

3. If you handled or restrained animal that carry zoonotic disease before, what types of zoonotic disease you have been exposed to? Please specify:

SECTION D: TYPES OF INJURIES AND DISEASES

In this section, you are required to recall the types of injuries or diseases you experienced for the past 12 months during the teaching and practice of veterinary medicine at the University Veterinary Hospital.

1. During the past 12 months, did you experience...?

**Select only one per row*

Injuries or Diseases	Yes	No
Slips. Trips or fall		
Needle-stick or scalpel blade injuries		
Animal induced injuries (Bites or scratches)		
Crushed or kicked by animals		
Hearing loss		
Sunburnt		
Muscle sprains, strains or tear		
Back or neck pain		
Allergic reaction due to animal's fur or hair		

Infected with zoonotic disease		
Allergic reaction due to chemical substances such as latex gloves, pesticides or disinfectants		
Depression		
Anxiety		

2. If you selected “Yes” for infected with zoonotic disease, please specify which zoonotic disease you were infected with:

3. If you selected “Yes” for allergic reactions, please list down the allergens below:

SECTION E: HAZARD PREVENTION AND INFECTION CONTROL

Select “Yes” if you agree that University Veterinary Hospital (UVH), UPM provided the following preventative measure:

Preventative Measure	Yes	No
Comply with the Guidelines on the Handling and Management of Clinical Wastes in Malaysia such as proper veterinary waste management and disposal		
Consider safety in the design of processes such as animal restraint and anaesthetic gas control system		
Promote safe work habits such as wearing appropriate PPE		
Ensure that the equipment is maintained and operated safely.		
Inform all workers and students about potential workplace hazards		
Consider safety in design and construction of animal handling, restraint, housing and other veterinary facilities		
Comply with Occupational Safety and Health Act 1994		
Develop and implement a comprehensive written workplace-specific safety and health program		
Have a medical surveillance system in place and record report work-related injuries and illnesses		
Review and update the written safety and health program periodically		
Document and maintain staff/student records of training, immunizations and work-related injuries and illness		

9.2 CUMULATIVE FREQUENCY GRAPHS OF HAZARDS

Figure 4: Cumulative Frequency of Working in an Extreme Temperature Environment, or Long Hour of Sun Exposure

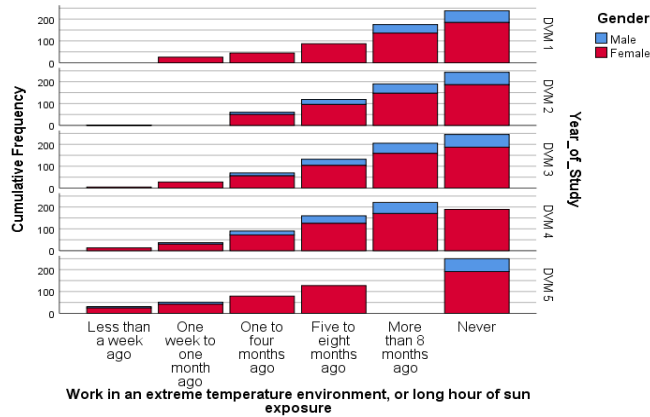


Figure 5: Cumulative Frequency of Working in a bent, twisted or awkward posture

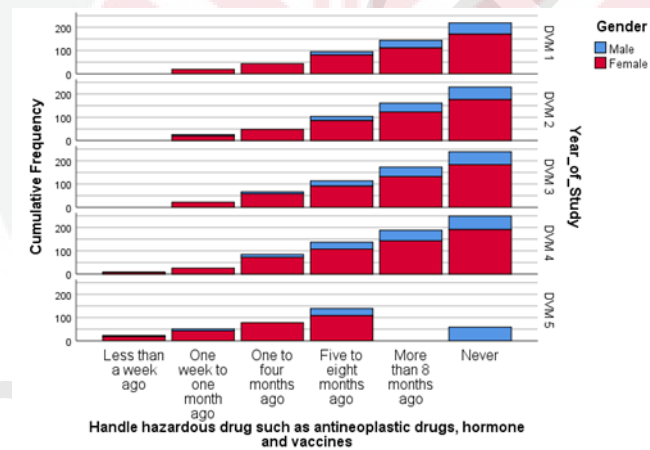


Figure 6: Cumulative Frequency of manually lift, carry or push items heavier than 20 kg

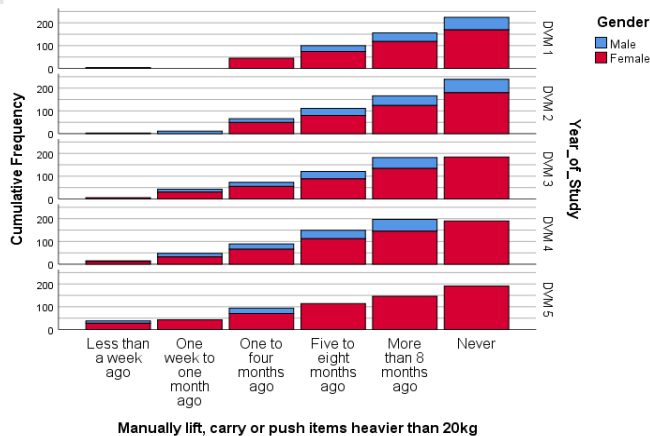


Figure 7: Cumulative Frequency of Handling hazardous drug such as antineoplastic drugs, hormones and vaccine

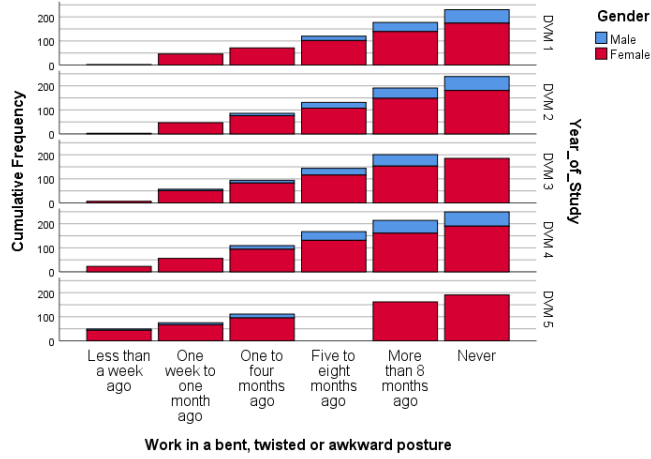


Figure 8: Cumulative Frequency of handling pesticides or ectoparasiticides

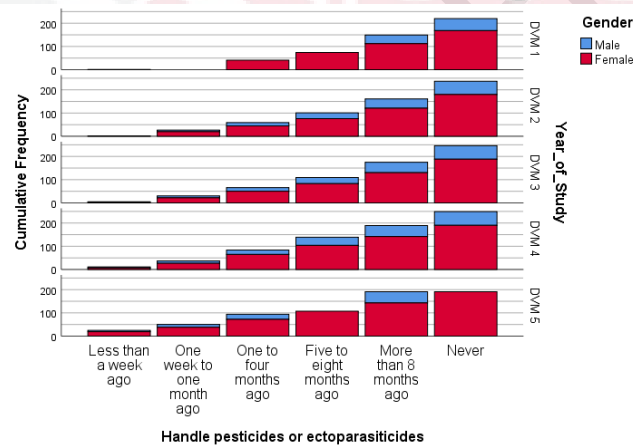


Figure 9: Cumulative Frequency of feeling little interest or pleasure in doing things

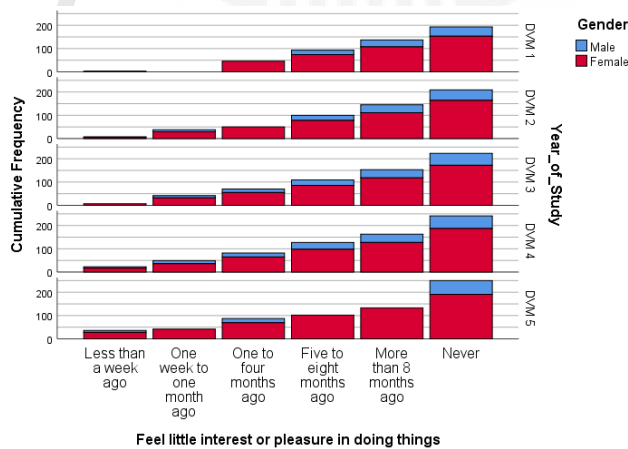


Figure 10: Cumulative Frequency of handling animal with zoonotic disease

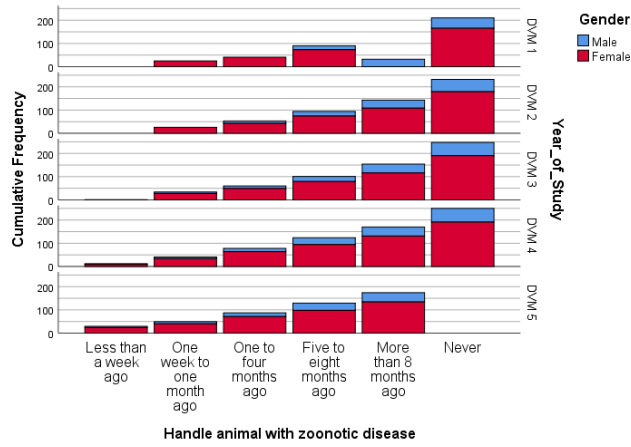


Figure 11: Cumulative frequency of Hazards associated with usage of anaesthetic gases

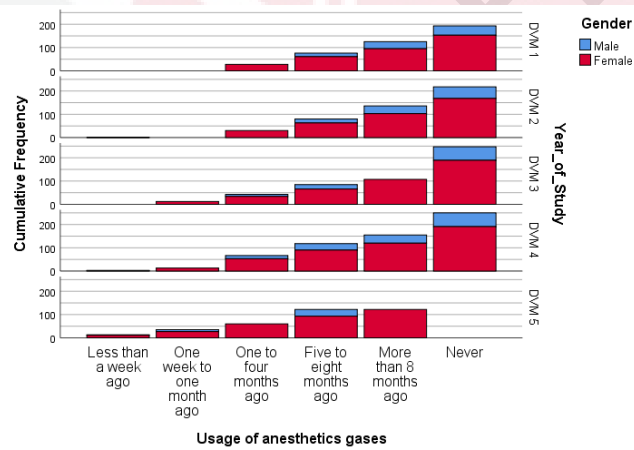


Figure 12: Cumulative frequency of working in dusty environment

