

## Occupational Hazards Associated with Veterinarians and Their Control Measures

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### Abstract

Being veterinarian involves complex and varied work. Occupational hazards affecting veterinarians includes physical, chemical and biological hazards. Veterinarians are at great risk of being injured because they encounter large and uncooperative animal's patients and also face adverse work-place exposure. Veterinary professionals are also exposed to a range of occupational hazards due to chemical exposure including formaldehyde, anaesthetics, pesticides, allergens and chemotherapeutic agents. Not only the animal patients cause injuries such as bites, scratches, kicks but they can also transmit zoonotic infections. Among these, biological risks are particularly important, mostly because of its zoonotic nature. Use of personal protective equipment, adequate knowledge of all occupational diseases, vaccination and hygiene, protect the veterinarians from physical, chemical and biological hazards. The objective of this review is to elucidate the health hazards associated with veterinarians in their different fields of practice and to demonstrate the common risks associated in the veterinary profession.

**Keywords:** Pesticides, Occupational hazards, Veterinarians, Zoonoses.

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Received: 07/05/2018

Accepted: 30/06/2018

### 1. Introduction

Veterinary medicine is the science that deals with the health and welfare of animals, particularly with regard to the prevention and cure of diseases. Since the health of humans is connected to the health of animals and the environment, veterinarian protects human health by controlling diseases that are transmitted from animals to humans (zoonoses) and ensuring the health check on foodstuffs of animal origin. Veterinarians and animal health auxiliary personnel are those who work with animals or come into contact with them during their routine practice. The demands of the profession expose veterinarians to various risks that include traumatic injuries while handling animals, exposure to infectious diseases transmitted by the animals or their parasites (Roberts, 1995), exposure to hazardous chemicals and drugs used in veterinary practices or they may even experience allergies while handling animals (Hill *et al.*, 1998). Biological agent can cause serious zoonotic diseases in veterinarians. Accordingly, these risks are classified as the physical, chemical and biological hazards (Fritschi *et al.*, 2008). Similarly, occupational and environmental pollutants always have hazardous impact on all living organisms (Katole *et al.*, 2013).

The job of veterinarian is multidisciplinary and involves the risk related to it. Veterinarians interact

with a wide variety of animal species under working environments which carry occupational hazards and risk of injury. The veterinarians are employed in the large field of activities, ranging from animal health and welfare to food safety and public health. Various types of veterinarians include companion animal practitioners, who treat pets and generally work in private clinics; equine practitioners, who work with horses; food animal practitioners, who work with farm animals such as cattle, sheep, goats, pigs, poultry and other food producing animals as fish and wild life practitioners who treat all types of wild animals. There are also laboratory veterinarians who deal with experimental animals, to ensure their health and welfare and deal with diagnostic procedures with various specializations including pathological anatomy, microbiology, virology, pharmacology, chemistry applied to foods, immunology etc. to identify the effects of new drug therapies, or to test new surgical techniques.

Proximity of the veterinarians to animals renders them susceptible to many harmful health hazards and a variety of strenuous and exhaustive work environment. The fine tuning of the expertise in handling animals and the knowledge of animal behavior is a handful of armor for self-protection and the safety of others as well. Despite these, there are

many unfortunate incidents that may occur in the field practice that have serious health concern. Lack of knowledge in the field of occupational health hazards and safety precautions for hazard free working conditions may enhance the risk of various occupational hazards in varying intensity among the veterinarians working in different nature of job. The hazards that veterinarians encounter can be divided into physical, chemical and biological.

## **2. Physical Hazards**

Trauma is the greatest cause of physical injury to veterinarians. Trauma includes bites, scratches and injuries caused by animals while handling and containing of the animals for treatment; injuries from sharp instruments such as syringes, needles, scalpel blades, nose tongs for cattle, halters, calf pulling equipment, metal cattle chutes and injuries from falls on slippery surfaces. Large animals are most likely to cause injury, predominantly in the upper extremities, but also dog bites, cat bites and scratches and horse kicks particularly result dangerous injuries. Veterinarians may accidentally inject themselves with a needle during uncapping or recapping the needle or while filling the syringe. More likely, it will be the chemical or biological agents introduced at the time of the needle-stick injury that cause severe problem and hence injury from contaminated sharps may result in illness (Jeyaretnam *et al.*, 2000). Other equipment used in veterinary practice such as calf pulling equipment, metal cattle chutes, restraining equipment, cage doors, ropes, dental drills, hanging scales and even ophthalmoscopes may cause injury especially to fingers, wrists and hands (Landercasper *et al.*, 1988).

The practice of veterinary medicine involves the risk of physical injury through contact with animals and equipment, repetitive motion, and motor vehicle accidents. Most bite, scratch, kick, and crush injuries from animals can be occurred due to inappropriate restraint of animals. Strains, sprains, back injuries and other repetitive motion injuries may occur when lifting, restraining, and treating animals (CDC, 2018). Individuals who work with large animals are often in compromised situations that expose them to physical injury. Penetration wounds result from animals, tools and equipment. Other physical injuries include burns from heat or ice, exposure to radiation. Injuries due to penetration wounds may also lead to serious viral and bacterial infections (Jeyaretnam and Jones, 2000). Commuting between farms and facilities increases the risk of motor vehicle accidents. Veterinarians are at risk because they pull, push and lift animals, some of which are very heavy. Sometime barking dogs might prove to cause noise problem to both to the veterinarian and auxiliary staff. Barking has been estimated often to

cause sound pressures over 85 dB and even up to 105 dB.

## **3. Chemical Hazards**

Adverse health effects due to exposure to chemical hazards have long been experienced by members of the veterinary profession. Veterinary practitioners treating domesticated and wild animals have to use large amounts of chemicals and the use of chemicals are on the increase. A number of potentially harmful chemicals are being commonly used by veterinarians and associated personnel. These include: formaline, inhalant anaesthetic gases such as Isoflurane, halothane and nitrous oxide, injectable anaesthetic agents, antineoplastic drugs, ultrapotent narcotic analgesics (pethidine and morphine), therapeutic agents (antibiotics), diethylstilbestrol (DES), heavy metals, immobilising agents, disinfectants/sterilants such as ethyleneoxide and glutaraldehyde, pesticides (organophosphates and pyrethrins) and xylazine. A corrosive chemical is the one which destroys or damages the living tissue on contact; an irritant produces local irritation or inflammation; sensitizers cause an allergic reaction; explosive/flammable products will burn or explode if a source of ignition is present and asphyxiants cause suffocation due to lack of oxygen and could be toxic or poisonous causing damage to cells and tissues. The chemicals may possess a number of severe toxic effects. The main forms of chemicals are solids, dusts, liquids, gases, vapours and aerosols (Mathews, 1993).

Many substances used in veterinary practice can cause hazardous effects due to their mutagenic, teratogenic, carcinogenic and acute toxic nature (Hill *et al.*, 1998). Chemicals used in veterinary practice also cause skin irritation and allergic reactions. Chemicals may accidentally be spilt on the skin, inhaled, ingested or injected. Most of these agents used in the health care industry and veterinary or zoo industry are either inhaled or absorbed through skin or mucous membranes. However, veterinarians are also at risk of accidentally injecting into themselves such as vaccines, antibiotics, anaesthetics and animal blood during treatment of wild or domesticated animals. Exposure to waste anaesthetic gases has been associated with renal and hepatic diseases, spontaneous abortions, congenital malformations, cancer and neurological and psychological disorders (NIOSH, 1986). Formaldehyde is often used by veterinarians to sterilise tissues or as a preservative for pathological specimens. It causes adverse health effects such as dermatitis and irritation of the eyes and respiratory tract, and sensitization to formaldehyde may lead to asthma (Loomis, 1979). Pesticides such as organophosphates, carbamates and pyrethrins have been frequently used in veterinary

practices. These agents are used directly on animals or applied to the area where the animal is confined. It is suggested that failure to take precautions such as wearing gloves when handling chemicals, could contribute to adverse reactions (Jeyaretnam and Jones, 2000). Apart from physical damage caused by needle-stick injuries, there is also the possibility of introducing chemicals and biological agents causing disease (Bowman and Wilkins, 1991).

#### **4. Biological Hazards**

Veterinary practitioners including zoo veterinarians are in frequent contact with a wide range of animals and are exposed to allergens from animal hair, dander, urine, saliva and other body fluids as well as chemicals that can cause irritation or allergic reactions (Lutsky *et al.*, 1985). Persons at risk include: pet owners, laboratory animal and veterinary technicians, researchers, veterinarians and others who have prolonged and close association with animals. Others at risk include workers who handle animal products and other materials such as bedding and animal feed. Through review on Prion diseases, animal health and zoonotic concern is available (Katole *et al.*, 2013). Frequent exposure to allergens of animal origin including blood proteins, ascarid worms and ectoparasites increase the probability of veterinarians developing occupational allergic respiratory diseases, allergy-related diseases and zoonotic diseases (Elbers *et al.*, 1996).

Biological risk continue to be the main occupational risk for vets: it is present in all work activities where there is risk of exposure to biological agents. Zoonosis and allergic reactions (respiratory symptoms or allergic contact dermatitis) to animal hair, dandruff and feathers proved to be the most frequent cause of occupational diseases in veterinary practice (Nienhaus *et al.*, 2005). A number of these substances have been implicated in cancer development or fetal loss during pregnancy in female veterinarians (Shirangi *et al.*, 2007). Women have become an increasingly significant proportion of practitioners in the veterinary profession. Public health veterinarians are more at risk of developing zoonotic diseases such as brucellosis, tuberculosis, leptospirosis, salmonellosis, and Q fever (Schnurrenberger, 1982). Zoonotic diseases with teratogenic and abortifacient effects include brucellosis, tuberculosis, cryptococcosis, listeriosis, lymphocytic choriomeningitis, Q fever, toxoplasmosis and Venezuelan equine encephalitis. Toxoplasmosis and listeriosis are of main concern for the veterinary profession as they cause abortions in female veterinarians (Milligan *et al.*, 1983).

#### **5. Occupational Safety for Veterinarians**

##### **5.1 Prevention Through Design Process**

One of the best ways to prevent and control workplace injuries, illnesses, and fatalities is to “design out” or minimize hazards and risks early in the design process. Prevention through design efforts in veterinary facilities and processes can protect workers and animals and be cost-effective.

- a) Consider safety in the design and construction of animal handling, restraint, housing and other veterinary facilities.
- b) Consider safety in the design of processes such as animal restraint and anesthetic gas control systems.
- c) Improved livestock handling facility design and restraining facilities can decrease injuries in animals and workers.
- d) Most bite, scratch, kick, and crush injuries from animals can be prevented by using appropriate restraint (CDC, 2018).

##### **5.2 Personal Protective Equipment**

To offer a barrier from animal and environmental exposures, veterinarians should use personal protective equipments (PPE) which protect certain areas of the body that may come into contact with animals. Personal protective equipment is worn to safeguard a person from all types of hazards. The personal protective equipments include 1. Disposable gloves for hands 2. Sleeve gloves for arms 3. Goggles or safety glasses for eyes 4. Face masks and face shields for mouth and nose 5. Hair bonnet for head and 6. Shoe covers for feet. These equipments should be worn and removed correctly in order to prevent contaminations or exposures (Babeiker, 2008).

##### **5.3 Personal Hygiene**

Veterinarians should follow the simple rules of hygiene such as hand washing, paring the nails, bodily cleanliness and cleanliness of clothes. The use of mild disinfectants is of great value in protection from biological agent’s contamination.

##### **5.4 Vaccination**

Immunizations where available play an important role in protection of veterinarians against certain zoonotic diseases. The use of pre exposure vaccines in cases of high probability of exposure to infectious diseases is an effective method to safeguard veterinarian’s health e.g. yellow fever vaccination when entering zones of yellow fever. The use of post exposure vaccine is of effective value in case of protection against rabies (Babeiker, 2008).

### 5.5 Rabies Pre-Exposure Vaccination

Rabies exposure is an occupational hazard for veterinarians and support staff who have animal contact. Pre-exposure rabies vaccines can help provide protection against rabies. All veterinarians should also check their protective anti rabies titre in their serum to prevent Rabies exposure. Bite and scratch wounds should receive immediate medical attention and care due to risks of infection and rabies exposure.

### 5.6 Worker Training

Veterinarian should train the animal care workers about hazards before they begin work. Refresher training should be conducted at regular intervals as and when required. Training should include information about the, potential workplace hazards, occupational risks for pregnant and immune-compromised workers, effective use of controls for reducing workplace exposures, standard veterinary precautions including infection control practices, safe handling, restraint and care of animals, preventing needle-stick, scalpel and sharps injury and emergency and evacuation procedures.

### 5.7 Awareness

As the awareness levels regarding occupational hazards among the veterinarians, wildlife health professionals should be near optimal, the need was felt

## References

- Babeiker HEAH (2008). Occupational health hazards to veterinarians a dissertation submitted to the University of Khartoum, Sudan.
- Bowman M and Wilkins J (1991). Occupational needle sticks injuries among female veterinarians. *In: The Society for Epidemiologic Research 24<sup>th</sup> Annual Meeting.*
- CDC (2018). Veterinary safety and health. Downloaded from <https://www.cdc.gov/niosh/topics/veterinary/hazard.html>. on 1.10. 2018.
- Elbers A, Blaauw P, de Vries M, van Gulick P and Smithuis O (1996). An epidemiological study of several professional groups of Dutch veterinarians Part 1. *Veterinary Q*, 18: 127-131.
- Fritschi L, Shirangi A, Robertson ID and LM day (2008). Trends in exposure of veterinarians to physical and chemical hazards and use of protection practices. *International Archives of Occupational and Environmental Health*, 81(3): 371-378.
- Hill DJ, Langley RL and Morrow WM (1998). Occupational injuries and illness reported by zoo veterinarians in the United States. *Journal of Zoo and Wildlife Medicine*, 29(4): 371-385.
- Jeyaretnam J, Jones H and Phillips M (2000). Disease and injury among veterinarians. *Australian Veterinary Journal*, 78(9): 625-629.
- Jeyaretnam J and Jones H (2000). Physical, chemical and biological hazards in veterinary practice. *Australian Veterinary Journal*, 78(11): 751-758.
- Katole SB, Deshpande KY, Kulkarni RC and Sonegaonkar AD (2013). Prion diseases - animal health and zoonotic concern: a review. *Journal of Foodborne and Zoonotic Diseases*, 1(2): 24-32.
- Katole SB, Kumar P and Patil RD (2013). Environmental pollutants and livestock health: a review. *Veterinary Research International*, 1(1): 1-13.
- Landercasper J, Cogbill T, Strutt P and Landercasper B (1988). Trauma and the veterinarian. *Journal of Trauma*, 28(8): 1255-1259.
- Loomis T (1979). Formaldehyde toxicity. *Archives of Pathology and Laboratory Medicine*, 103: 321-324.
- Lutsky I, Baum G, Teichtatil H, Mezar A, Aizer F and Barsela S (1985). Occupational respiratory disease in veterinarians. *Annals of Allergy*, 55(2): 153-156.
- Mathews J (1993). Health and safety at work. Australian Trade Union Safety Representatives Handbook. Pluto prem. Australia Ltd., New South Wales.
- Milligan J, Sarvatdeo R and Thalken C (1983). Carcinogens, teratogens and mutagens: their impact on occupational health, particularly for women in veterinary medicine. *Journal of Environment Health*, 46: 19-24.
- National Institute for Occupational Safety and Health (1986). Recommended standard for occupational exposure to

to enforce efforts aimed at addressing prevention of occupational hazards by developing and implementing improved safe handling practices and safety precautions. Working protocols for various species or situations giving due emphasis to personal safety would help in reducing and preventing occupational injuries and illness among veterinarians, wildlife health professionals, besides dissemination of information through training programs and networking between professionals.

## 6. Conclusion

Veterinarians often sustain animal-related injuries, some of which have led to hospitalization. The costliest injuries to veterinarians include strains and back injuries. Other occupational risks to which veterinarians are subjected include penetration wounds especially to needle-stick and scalpel injuries. Disease as a result of exposure to chemicals is difficult to quantify, however there are potential risks from long-term and short-term exposure to a number of chemicals. Disease resulting from infection with a zoonotic agent is infrequent however the potential to be quite serious has. Use of personal protective equipments, vaccination and awareness about occupational health hazards are control strategies to prevent occupational health hazards in veterinarians.

- waste anaesthetic gases and vapors. *National Institute for Occupational Safety and Health, Cincinnati*, 77-140.
- Nienhaus A, Skudlik C and Seidler A (2005). Work-related accidents and occupational diseases in veterinarians and their staff. *International Archives of Occupational and Environmental Health*, 78: 230-238.
- Roberts JA (1995). Occupational health concerns with nonhuman primates in zoological gardens. *Journal of Zoo and Wildlife Medicine*, 26(1): 10-23.
- Schnurrenberger PS (1982). Overview of the zoonoses. Foundation for Continuing Veterinary Education, Perth, Murdoch University.
- Shirangi A, Fritschi L and Holman CDJ (2007). Prevalence of occupational exposures and protective practices in Australian female veterinarians. *Australian Veterinary Journal*, 85(2): 32-38.