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Protective equipments use by veterinarians in Nigeria

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The transmissible nature of certain diseases makes anthropozoonosis an important hazard associated with veterinarians. For this reason, the attitude and compliance of veterinarians in Nigeria to personal protective equipment (PPE) use was studied using a structured interviewer-administered questionnaire. Questionnaires were administered at the 2017 Veterinary continuing education seminar held at Akure (Ondo state), Veterinary clinics, and schools across the six (6) geopolitical zones in Nigeria. A total of 516 Veterinarians with specialties in large animals (40.7%), small animals (36.8%), avian (19.4%), wildlife (1.9%), and general practice (1.2%) participated in the study. More female veterinarians specialized in small animals (15.5%) than avian (3.9%), large (1.9%), and general practice (0.4%). PPE use varied in both clinical and non-clinical procedures and across the specialty. Only 176 (34.1%) veterinarians have attended PPE seminars on training and re-training since they began to practice, organized by the government (23.3%) and non-governmental organizations (76.7%). Attendees sponsors at such seminars were self (38.6%), governmental (44.3%), and non-governmental organizations (17.0%). This study highlighted the potential route of the spread of some zoonotic pathogens to other humans. There is a need to embark on measures that will encourage the use of PPE among veterinarians across specialties in Nigeria.

Key words: Nigeria, personal protective equipment, veterinarian, knowledge, attitude.

INTRODUCTION

Veterinarians play an important role in ensuring food security and safeguarding public health. If not played out effectively, they could serve as sentinels to emerging diseases, disseminating zoonotic pathogens to their relatives or animals (Baker and Gray, 2009). The sero prevalence of zoonotic pathogens is reported to be higher

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in veterinarians than in the general population (Sanchez et al., 2017). That's why zoonosis is a recognized occupational risk to which veterinarians are subjected (Sanchez et al., 2017). Though there is no statistics from Nigeria till date, women had been long predicted to represent the majority of Veterinarians (Anonymous, 2002). Systematic literature reviews showed that 30–40% of veterinarians in the USA and 60–65% in the United Kingdom and South Africa have been infected with zoonotic diseases (Gummow, 2003; Lipton et al., 2008). Fatal cases have been also reported (Hanna et al., 2006). In the past, Personal Protective Equipment (PPE) – specialized clothing or equipment worn by workers, has been used to prevent some of these occupational hazards. Some factors encouraging its use are the supervisor's attitude, organizations support for worker's safety and health, reinforcements for individual compliance level, proper training and refresher courses, personnel responsibility, peer pressure to use PPE, and appropriate and comfortable pieces of equipment (Lombardi et al., 2009). The use of PPE has been evaluated among animal farmers (Fatiregun and Saani, 2008; Odo et al., 2015), healthcare and textile workers (Lee et al., 2015; Tadesse et al., 2016). However, there is not much information on the use of PPEs by veterinarians in Nigeria. Therefore this study aims to assess the rate of PPE use among veterinarians in Nigeria. The objectives of this study include (1) assessing the attitude of veterinarians' toward the use of PPE in some clinical activity and (2) determining the frequency and determinants of PPE usage among veterinarians in Nigeria.

MATERIALS AND METHODS

The questionnaire was pre-tested at six veterinary institutions from the six administrative regions, which formed 10% of the total veterinarians sampled. It was thereafter administered across the studied regions in 2017. PPE use for the different clinical situations in this survey was categorized into: No PPE, Inadequate PPE, and adequate PPE use (Scheftel et al., 2010). For this purpose, boiler suits/Laboratory coats, boots, and gloves were considered adequate while the omission of one of these makes it inadequate.

Consent of ethics

The study was conducted following the Declaration of Helsinki, and approved by the University of Abuja Ethical Review Board.

RESULTS

A total of 516 Veterinarians with specialties in large animal (40.7%), small animal (36.8%), aviary (19.4%), wildlife (1.9%), and general practice (1.2%) participated in the study. Respondents were with varying qualifications. While none specialized in wildlife, the participation of female veterinarians was more in small (15.5%) than in aviary (3.9%), large (1.9%), and general practitioners (0.4%) (Table 1). Only 44.2% of respondents always use PPE when treating animals. Occasional use of PPE was observed more among small animals (25.4%) when compared to large animals (22.7%), avian medicine (5.8%), and general practitioners (1.9%) ($P < 0.05$). Disease severity (53.8%), PPE availability (37.2%), and client requests (9.0%) were the determinants of the occasional use of PPE, and these varied across the specialties. The use of PPE by other Veterinary Doctors also varied among respondents (Table 2). Only 176 (34.1%) veterinarians have attended PPE seminars on training and re-training since they began to practice. Although organized by the government (23.3%) and non-governmental organizations (76.7%), attendee sponsors at such seminars were personal (38.6%), government (44.3%), and non-governmental organizations (17.0%) (Table 3). The proportion of PPE among the specialties varied with procedures encountered in practice (Table 4).

DISCUSSION

The concept of 'One Health' has made the action and activity of veterinarians an important tool to safeguard human health. To this end, this study states the attitude of animal practitioners to PPE use and proposes measures that can improve the use of personal protective equipment. It is the first study to summarize PPE use among the different specialties of the profession. The gender participation of more males than females may be explained by the decreasing population of female veterinary graduates in Nigeria, as females accounted for 49% in the year 2007 and 35% in 2017 (In a conversation with D. Fadipe, VCN (March 2017)). This is contrary to the increasing worldwide participation of females in the veterinary profession (Lofstedt, 2003). The sex ratio was lower in small animals than in other specialties. The less physical and outdoor activity in small animal practice could have accounted for this gender specialty preference. This study did not assess the impact of post-graduate qualification on PPE use. However, it suggests that higher qualification has no impact on PPE use. This is at variance with Dowd et al. (2013), who reported that veterinarians with post-graduate qualifications were more likely to use PPE.

As earlier reported by Dowd et al. (2013), the irregular and conditional use of PPE during practice could lead to a higher risk of zoonosis among veterinarians. However, it has been opined that the use of PPE is very low in small animal practice unless it is to reduce transmission of some organisms like Parvovirus, as dealing with zoonotic diseases is extremely rare in this specialty (In a conversation with D. Fadipe, VCN (March 2017)). Aside from zoonosis, a veterinarian's PPE use status could be used for litigation when the opportunity presents itself. Our data indicated that PPE use, in the examination of apparently healthy animals, by veterinarians in different

Table 1. Participant demography.

Variable	Respondents (number) animal specialty					
Sex	**LA (%)**	**SA (%)**	**Av (%)**	**WL (%)**	**GP (%)**	**Total (%)**
Male	200(38.8)	110(21.3)	80(15.5)	10(1.9)	4(0.8)	404(78.3)
Female	10(1.9)	80(15.5)	20(3.9)	0(0)	2(0.4)	112(21.7)
Highest qualification						
DVM	60(11.6%)	90(17.4)	30(5.8)	0(0)	0(0)	180(34.8)
MSc.	129(25)	91(17.6)	50(9.7)	0(0)	4(0.8)	384(53.1)
PhD	17(3.3)	13(2.5)	20(3.9)	10(1.9)	2(0.4)	62(12.0)
Affiliation						
Sta Federal civil service	65(12.6)	86(16.7)	0(0)	0(0)	20(3.9)	171(33.2)
University	85(16.5)	38(7.4)	43(8.3)	10(1.9)	0(0)	176(34.1)
Research institute	11(2.1)	0(0)	0(0)	0(0)	10(1.9)	21(4.0)
Private	39(7.6)	52(10.1)	57(11.0)	0(0)	0(0)	148(28.7)

LA: large animal; SA: small animal; AM: avian medicine; WL: wildlife; GP: General practice.
Source: Authors

Table 2. Participant summary on PPE.

Category	Respondents animal specialty					
Frequency of PPE use	**LA (%)**	**SA (%)**	**Av (%)**	**WL (%)**	**GP (%)**	**Total (%)**
Always	73(14.1)	55(10.7)	70(13.6)	10(1.9)	20(3.9)	228(44.2)
Occasionally	117(22.7)	131(25.4)	30(5.8)	0(0)	10(1.9)	288(55.8)
The determinant of occasional PPE use						
Availability	68(13.2)	29(5.6)	0(0)	0(0)	10(1.9)	107(20.7)
Disease severity	49(9.5)	77(14.9)	29(5.6)	0(0)	0(0)	155(30)
Client request	0(0)	26(5.0)	0(0)	0(0)	0(0)	26(5.0)

LA: large animal; SA: small animal; AM: avian medicine; WL: wildlife; GP: General practice.
Source: Authors

practice types, was lacking or inadequate. This finding agrees with the study of Wright et al. (2008) who found lower PPE usage among United States veterinarians during the examination of healthy animals. Professional bias and PPE costs could be some of the barriers to its usage.

The aseptic nature associated with surgeries and the zoonotic concerns during post-mortem could be some factors that improved PPE usage

Table 3. PPE use in some clinical and non-clinical procedures.

Procedures	PPE Status	LA (%)	SA (%)	Av (%)	WA (%)	GP (%)	Total (%)
Examination of apparently healthy animals	No PPE	46(8.9)	55(10.7)	50(9.7)	10(1.9)	23(4.5)	184(35.7)
	Adequate PPE	20(3.9)	83(16.1)	43(8.3)	0(0)	0(0)	146(28.3)
	Inadequate PPE	124(24.0)	48(9.3)	7(1.4)	0(0)	7(1.4)	186(36.1)
Examination of sick animals	No PPE	58(11.2)	30(5.8)	8(1.6)	1(0.2)	0(0)	39(18.8)
	Adequate PPE	47(9.1)	148(28.7)	90(17.4)	0(0)	10(1.9)	295(57.1)
	Inadequate PPE	83(16.1)	10(1.9)	2(0.4)	9(1.7)	20(3.9)	124(24.0)
Surgeries	No PPE	10(1.9)	0(0)	0(0)	0(0)	0(0)	10(1.9)
	Adequate PPE	132(25.6)	178(34.5)	82(15.9)	0(0)	17(3.3)	409(79.3)
	Inadequate PPE	48(9.3)	8(1.6)	18(3.5)	10(1.9)	13(2.5)	97(18.8)
Postmortem examination	No PPE	10(1.9)	0(0)	0(0)	0(0)	0(0)	10(1.9)
	Adequate PPE	124(24.0)	165(32)	97(18.8)	10(1.9)	18(3.5)	414(80.2)
	Inadequate PPE	56(10.9)	21(4.1)	3(0.6)	0(0)	12(2.3)	92(17.9)
Sample collection	No PPE	9(1.7)	10(1.9)	0(0)	0(0)	0(0)	19(3.6)
	Adequate PPE	61(11.8)	127(24.6)	68(13.2)	9(1.7)	16(3.1)	281(54.4)
	Inadequate PPE	120(23.3)	49(9.5)	32(6.2)	1(0.2)	14(2.7)	216(41.9)
Assisted delivery	No PPE	8(1.6)	41(7.9)	40(7.8)	0(0)	0(0)	89(17.3)
	Adequate PPE	102(19.8)	105(20.3)	30(5.8)	10(1.9)	19(3.7)	266(51.5)
	Inadequate PPE	80(15.6)	40(7.8)	30(5.8)	0(0)	11(2.1)	161(31.3)
Chemical/pesticide handling	No PPE	30(5.8)	20(3.9)	24(4.7)	0(0)	0(0)	74(14.4)
	Adequate PPE	98(19.0)	156(30.2)	35(6.8)	10(1.9)	30(5.8)	329(63.7)
	Inadequate PPE	62(12.0)	10(1.9)	41(7.9)	0(0)	0(0)	113(21.8)

LA: large animal; SA: small animal; AM: avian medicine; WL: wildlife; GP: General practice.
Source: Authors

compliance among veterinarians that reported adequate PPE use in the examination of sick animals, during surgeries, post-mortem, and assisted deliveries. However, lack of or inadequate PPE usage as reported by some respondents of different practice types is alarming and could result from the personal unexplained belief of PPE not preventing zoonosis. After all, some studies showed that none or inadequate PPE use was a significant risk factor for brucellosis in Indian veterinarians and Q-fever infection in Dutch veterinarians (Van den Brom et al., 2013; Mangalgi et al., 2016). Except for wildlife veterinarians, respondents of different practice types reported poor adherence to PPE use during sample collection. This could have occurred because of the age-long importance of wildlife, as it constitutes a large and often unknown reservoir

Table 4. History of educational exposure on PPE.

Educational exposure on large animal veterinarians on PPE	Animal specialty (%)					
On-job seminar/workshop	**LA**	**SA**	**Av**	**WL**	**GP**	**Total (%)**
Yes	60(11.6)	78(15.1)	20(3.9)	8(1.6)	10(1.9)	176(34.1)
No	130(25.2)	108(20.9)	80(15.5)	2(0.4)	20(3.9)	340(65.9)
The organizer of the seminar/workshop						
State/Federal government	0(0)	41(7.9)	0(0)	0(0)	0(0)	41(7.9)
Non-governmental organization	60(11.6)	37(7.2)	20(3.9)	8(1.6)	10(1.9)	135(26.2)
Sponsor of attendee seminar/workshop						
Self-sponsored	0(0)	48(9.3)	20(3.9)	0(0)	0(0)	68(13.2)
Government	60(11.6)	10(1.9)	0(0)	8(1.6)	0(0)	78(15.1)
Non-governmentalorganizations	0(0)	20(3.9)	0(0)	0(0)	10(1.9)	30(5.8)

LA: large animal; SA: small animal; AM: avian medicine; WL: wildlife; GP: General practice.
Source: Authors

of emerging diseases (Chomel et al., 2007). This is contrary to Anderson and Weese (2015) that reported good PPE utilization during staff-animal contacts in veterinary clinics in Ontario, Canada. Contrary to the work of Shirangi et al. (2007) and Epp and Waldner (2012) that some veterinarians who did not use PPE in Western Canada and Australia were exposed to chemicals especially pesticides, Garrigou et al. (2020) found that wearing of PPEs does not always guarantee effective protection against pesticides. These notwithstanding, most of the study respondents reported adequate PPE use when handling chemicals such as pesticides.

Conclusions

Either by personal decision, enforcement by the employer, or industry regulators, Veterinarians must be kept abreast, updated, or reminded of PPE use continually. Methods that could be adopted to prevent exposures, and improve professional practice and patient outcomes are (1) Establishment of infection controls committees across all veterinary establishments that care for animals. (2) Development of practical workplace interventions like incorporating PPE into various continuing education programs, and introduction of live video camera monitors in their work environments, among others.

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CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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