Journal of Sustainable Veterinary & Allied Sciences
P-ISSN-2695-2661 e-ISSN: 2811-1346
JoSVAS 2025 December Vol. 7 Issue 4: 334-339

Original Research

WORKPLACE HAZARDS ASSOCIATED WITH THE USE OF SURGICAL INSTRUMENTS AND THEIR PREVENTIVE MEASURES AMONG VETERINARIANS IN NIGERIA

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ABSTRACT

Many veterinarians are involved in hazards associated with the use of surgical instruments. This study investigated the prevalence of surgical-instrument-injury (SII) among veterinarians in Nigeria. A total of two hundred and forty-nine (249) structured questionnaires were administered to veterinarians attending National Congress at Sokoto State in 2018. Two hundred and twelve (85.1%) were retrieved, of which, 68.9% were males, 19.8%, females and 11.3 % did not indicate their sexes. The 17.5% of the respondents had 1-5 years of experience; 29.7% had 6-10; 31.6% had 11-20, while 21.2% had above 20 years. Respondents were drawn from ministries (39.6%), schools (31.6%), private practitioners (16.4%), and others (12.4%). Only 91.0 % of the respondents were involved in veterinary practice, of which, 19.2% performed surgery always; 37.8% often and 43.0% rarely. The most performed procedures were castrations (51.8%), wound repair (49.2%) and caesarean section (40.4%). Poor restraint techniques and lack of assistants were the major predisposing factors to SII. The frequency of injuries related to surgical instruments were needle (63.2%), scalpel (51.4%), bites (52.5%), razor (42.5%) and mallets (26.2%) while injuries involved were: cuts, mallet injury, animal bites/ kicks, horn goring, drug splash and needle prick/puncture. The preventive measures to SII were proper restraint (44%), adequate instruments (25%), workforce (18%), capacity building (12.6%) and combination of these measures. Veterinarians should prioritize their safety during practice. Workshop for capacity building, loans for basic surgical instruments and review of Veterinary Curriculum should be of lasting solutions to SII among Nigerian veterinarians.

Keywords: Hazard; practicing veterinarians; safe practice; surgery; surgical-instrument.

INTRODUCTION

Many practicing veterinarians that engage in different surgical procedures encountered various injuries associated with the use of different surgical instruments (Peterson, 2002; Brodbelt, 2008; Mishra & Palkhade, 2020). The risks associated with surgical instrument injury (SII) among veterinarians may be more complex because of ambulatory nature of some part of the profession where various surgical practices such as dehorning, ear notching, castration, teeth amputation and others are performed in farm animals. Also included among these practices are some invasive and emergency rumenotomy, laparotomy and caesarian sections in food animals. Radiography and orthopedic procedures that are common among equine practitioners, and tissue repairs in wild life have various cases of these SII (ILO/CIS, 2000; Nienhaus *et al.*, 2005).

Veterinary Surgery is the science and art of management of animal diseases through incision, excision, reshaping, repositioning and other manipulations by the use of instruments (Freeman, 2003). These surgical instruments including orthopaedic, ophthalmic, dental and diagnostic and general surgical instrument require high level of technical skills to handle (Freeman, 2003). The mastery of these instruments to a large extent determines the success of all the

http://doi.org/10.54328/covm.josvas.2024.205

surgical procedures in veterinary hospitals, clinics and during ambulatory services (Freeman, 2003).

According to the International Labour Organization (ILO), workers die each year as a result of work related injuries, resulting in a total loss of about 2.99 trillion United State Dollars (USD), or 3.94 percent of world GDP (Aluko *et al*., 2016; Fowler *et al*., 2016; Kumar *et al.,* 2021). In terms of non-fatal occupational illnesses and injuries, veterinary services are ranked fifth in the United States and Veterinary Surgeons have a fair share of these hazards due to their predisposition to surgical instruments and equipment (Epp & Waldner, 2012; Parmar *et al*., 2021; Kumar *et al.*, 2021).

There are limited number of veterinary practitioners in the field of surgery, thereby exposing veterinary surgeons to most of these SII during pre-operative procedures, diagnoses, intra-operative and post-operative procedures. In addition, some veterinarians are short of complete surgical instruments, complete surgical team, animal handlers, complete anaesthetic agents and other basic requirements to carry out specific surgical procedures (Hassan & Hassan, 2003). These limitations are compounded when the surgery is performed in the field due to emergency of the intervention and immobility of some big instruments and /or difficulties associated with transporting the patients to the theatre (Jeyaretnam *et al*., 2000; Jeyaretnam & Jones, 2000; Bonini *et al*., 2015; Kumar *et al.,* 2021). These contribute in exposing the surgeons to other psychological risks such as fatigue, stress and prolonged working hours (ILO, 2000).

In humans, the operating room hazards among surgical nurses are widely documented (Mekonnen *et al.,* 2019; Corvino *et al.,* 2021*).* ILO, (2000) prioritized operating room hazards to include some physical, biological, chemical and psychological hazards. Physical hazards such as cuts, stabs, scratches, suture needle pricks, mallet injury, drug splash and accidental animal bites have been documented (Hassan & Hassan, 2003). Chemical hazards such as anesthetic gas inhalation, contact with corrosive drugs, radiation hazards, inhalation of disinfecting and sterilizing agents, all of which expose the personnel and patients to tissue irritations, tissue damages, skin burns, traumatic pain, bleeding and some other allergic conditions (Peterson, 2002; Hassan & Hassan, 2003). Biological hazards including zoonotic and infectious disease conditions such as toxoplasmosis, leishmaniasis, dermatophytosis, tuberculosis, contact dermatitis and exposure to some drugs such as brucella vaccine, Rabies vaccine, antibiotics and steroidal drugs (Rajendra *et al*., 2002; Awosile & Omoshaba, 2013; Mekonnen *et al.,* 2019). Psychological risks such as fatigue, emotional trauma, stress, anxiety and depression (ILO, 2000).

Out of the categories of occupational hazards among veterinarians, Physical health hazards (injuries) such as animal bites, scratches, needle prick injury and radiation injury are the most common health hazards (Kumar *et al*., 2021; Parmar *et al*., 2021). Mshebuala *et al*. (2015) reported that 79.5% of practicing veterinarians that attended NVMA national convention in 2015 have suffered needle prick injuries and most of them were unreported.

There is paucity of information on the SII among veterinarians in Nigeria. This work aims to evaluate the surgical-instrument-injury (SII) among practicing veterinarians during surgical procedures for awareness, safety, precautions, and for adequate preventive measures to be recommended.

MATERIALS AND METHODS

A cross sectional study was conducted using a structured questionnaire to determine the prevalence of surgical-instrument-injury among practicing veterinarians in Nigeria. The questionnaires were developed and pretested for validity and reliability among 18 veterinarians involved in clinical practice in a Veterinary Teaching Hospitals in Nigeria. The questionnaires were subsequently administered to veterinarians attending the 55th Annual National Congress of the Nigerian Veterinary Medical Association (NVMA) at Usman Danfodiyo University, Sokoto State in 2018. The questionnaires were administered to all willing attendee veterinarians irrespective of their places of work: ministries, schools, private practitioners, and others. Respondents who requested to know the purpose of the study were briefed and they were also at liberty to skip questions they did not want to answer. The respondents were equally informed of the possibility of more than one answer in a question, based on the design of the questionnaires (NJoku *et al*., 2015). A total of two hundred and forty-nine questionnaires were distributed and the questionnaires covered various aspects of demographics, years in practice, involvement in surgical practice, instruments used, injuries encountered using the instruments and solutions to SII. The responses of the respondents from the questionnaires completed and returned were collated and recorded using an excel sheet and data were presented with the aid of descriptive statistics, frequency and percentage.

RESULTS

A total of two hundred and forty-nine (249) questionnaires were distributed, out of which two hundred and twelve (85.1%) were completed and returned. The analysis of the findings were based on the 85.1% questionnaires that were completed and returned. Observations from the respondents showed that; 68.9% of the respondents were males and 19.8% were females, while 11.3 % did not indicate their sexes. Further, 17.5% of the respondents who completed and returned the questionnaires have between 1-5 years of

experience; 29.7% have between 6-10 years of experience; 31.6% have between 11-20 years of experience while 21.2% have more than 20 years of experience. About 39.6% of the respondents work in government ministries; 31.6% work in veterinary schools, 16.4% were private practitioners while 12.4% of the respondents work in other places such as companies and NGOs. Some veterinarians work in more than one place by virtue of sabbatical or consultancy services (Table I).

Also, 91.0 % of the respondents asserted that they have been involved in veterinary clinical practice while 9.0% have never been involved in any related veterinary clinical practice (Table 11). In addition, 19.2% of the respondents that have been partly or fully involved in veterinary clinical practice performed surgery always, 37.8% performed surgery often while 43.0% rarely performed surgery (Table II).

Out of the 91.0 % of the respondents involved in veterinary surgical practice, castration was the most often performed surgery (51.8%) followed by wound repair (49.2 %), and then Caesarian Section (40.4%). About 42.7% respondents rarely involved in ear cropping while 24.1% have never engaged in ovariohysterectomy (OVH). Only 3.7 % of the respondents have not encountered the case of wound repair in their practice. Respondents equally highlighted other surgical procedures such as ear notching, hoof trimming and teeth amputation, which were occasionally presented by clients and were attempted by some veterinary practitioners (Figure I).

Majority of the respondents (23% always, and 38.5% often) asserted that poor restraint techniques was the major predisposing factor to SII. This was followed by non-availability of assistants (14.6% always; 45.2 % often) lack of instrument (19.2% always; 36.7% often), however inexperience is also a contributing factor (18.0% always; 14.8% often) (Table III).

Although respondents agreed that they have been involved in SII, the frequency of these injuries vary with different surgical instruments. The SII related to needle prick (63.2%) was the most encountered followed by those related to scalpel (51.4%), bites (52.5%) and razor (42.5%), while SII related to the mallets was the least (26.2%). Also respondents agreed that injuries related to drug splash (40.4%), razor blade (17.9%) and needle prick (15.7%) were often encountered while injuries related to scalpel blade (4.8), and needle prick (4.1%) were always encountered. The injuries involved were: cuts, mallet injuries, animal bites, kicks, horn goring, drug splash and needle prick (Table III).

Further, 44% of the respondents believe that proper restraint of animals will be the solution or precaution against these highlighted SII, 25.3% agreed that availability of appropriate instruments for these practices is the solution, 18% noted that improvement in workforce is the solution while 12.6% opined that capacity building is a preventive measure. However, virtually all the respondents believe that combination of these precautionary measures will go a long way in ameliorating these problems (Fig II).

Table I. Demography of the Respondents

Categories	Number of respondents	Percentage of respondents
Sex		
Male	146	68.9
Female	42	19.8
Unidentified	24	11.3
Experience (Years)		
1-5	37	17.5
6-10	63	29.7
11-20	67	31.6
21 and above	45	21.2
Affiliation		
Government ministries	89	39.6
Veterinary schools	71	31.6
Private practitioners	37	16.4
Other agencies	28	12.4

DISCUSSION

This study aims to identify surgical-instrument-injury among practicing veterinarians during surgical procedures. The higher number of male respondents compared with the females reflected the disparity in the genders among practicing veterinarians that attended the convention. This disparity might be due to progressive decline in female practicing veterinarians in Nigerian. This agreed with the reported decrease in female graduates in veterinary profession from 49% in 2007 to 35% in 2017 (Lucas *et al.*, 2009; Fadipe, 2017; Akinbobola *et al.*, 2023). Also the finding that hazards in veterinary practice was reported more frequently in female than in male veterinarians might be an

Table II. Practicing Veterinarians among Respondents

Categories	Number of Respondents	Percentage of Respondents
Involved in clinical practice		
Yes	193	91.0
No	19	9.0
Frequency of involvement in Surgical procedure		
Always	37	19.2
Often	73	37.8
Rarely	83	43.0

Table III. Distribution of Predisposing Factors and Associated Surgical Instrument Injury (SII) among Respondents

Predisposing Factors	**Distribution among Respondents**			
	Always	Often	Rarely	Non
Lack of assistant (%)	22 (16.3)	61 (45.2)	35 (25.9)	17(12.6)
Anaestheticunder dose/Overdose (%)	6 (5.3)	24 (21.2)	39 (34.5)	44 (39.0)
Lack of instrument (%)	23 (19.2	44 (36.7)	31 (25.8)	22 (18.3)
Poor restraint technique (%)	36 (23.0)	60 (38.5)	48 (30.8)	12 (7.7)
Inexperience (%)	22 (18.0)	18 (14.8)	72 (59.0)	10 (8.2)
Associated SII				
Orthopaedic mallet (%)	2 (1.4)	11 (7.6)	38 (26.2)	94 (64.8)
Scalpel blade (%)	7 (4.8)	16 (10.9)	75 (51.4)	48 (32.9)
Razor blade (%)	4 (3.0)	24 (17.9)	57 (42.5)	49 (36.6)
Bite/kick (%)	3 (2.2)	32(23.0)	73 (52.5)	31 (22.3)
Drug splash (%)	4 (2.7)	61 (40.4)	74 (49.0)	12 (7.9)
Needle prick (%)	6 (4.1)	23 (15.7)	93 (63.2)	25 (17)

added factor (Epp & Waldner, 2012). However, this was contrary to the increasing number of female veterinarians at the global level (Lofstedt, 2003). Although respondents have the liberty to skip some questions, the reasons why some could not indicate their sexes are unknown.

Age category between 6- 20 years in practice constituted highest number of respondents, probably that age bracket represented the most active time in practice, and a period when people are gainfully employed with youthful exuberances and willingness to acquire latest skills in the profession. A good number of younger veterinarians were still job applicants and in post graduate schools and therefore lacking sponsorship to conferences, those above 20 years in practice may be retiring or actively engaged in other activities leading to delegation of their staff to the conference.

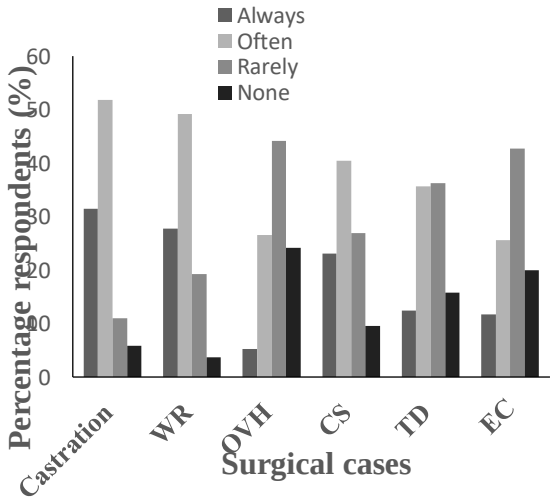
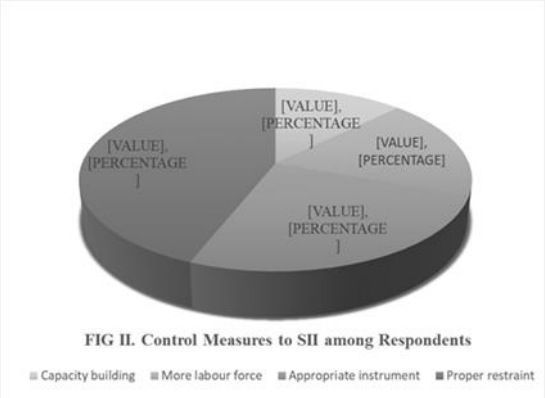


Figure I: Percentage distribution of surgical case among respondents; WR: wound repair; OVH: ovariohysterectomy; CS: caesarian section

The higher number of respondents from government institutions might be a reflection of the ability to participate in the conference among the attendees.



Government institutions may sponsor their staff or subsidize the cost of the conference making it possible for their staff to attend. This is unlike the younger veterinarians and those in private sectors with low income and hence, unable to afford the cost of the conference. Akinbobola *et al*. (2023) reported that only 38.6% of veterinarians were able to sponsor themselves to a Protective Personal Equipment (PPE) Use Seminar in Nigeria**.**

The results of this study showed that least experienced veterinarians had the minimum percentage attendance in the conference. This is possible probably because government agencies enjoy sponsorship for conference attendance. Government agency equally benefit supply of surgical instruments from the government making it possible for them to take part in veterinary practice.

There may also be a strong relationship between the place of work and involvement of respondents in surgical practice. Many government employees may be engaged in other duties such as security, administrative and academic duties. In veterinary schools, only clinicians and few others in

surgery specialty participate in surgical procedures, thus creating the impression of rare participation in veterinary surgical practice.

Castration is the most surgical practice for all veterinarians. It is common, simple, elective and practiced in all species of animals. Also traumatic wounds is commonly sustained through bites, fall, horn goring and accident and in all species of animals. This is followed by CS which is an emergency in all species and the farmer or pet owner will have no option but to save the dam and the neonate. These are likely reasons they are mostly always and often presented before the veterinarians. Other procedures are rarely practiced because they may be selective in particular species or for only cosmetic procedures. Respondents equally highlighted other surgery procedures that are presented by clients and are attempted by most veterinarians such as ear notching, hoof trimming and teeth amputation.

According to the respondents, poor restraint technique predominates as the major cause of these injuries, followed by unavailability of assistants and lack of instruments in surgical practice. Poor restraint technique may be indication of inadequate training of young veterinarians with life animals both in the hospital theatres and in the fields. Assistants and instruments may be lacking because they are capital intensive. It has been reported that factors contributing to occupational hazards among veterinarians include: inadequate infrastructure, inadequate diagnostic aids, inexperience and poor restraint technique (Jeyaretnam & Jones 2000); Bonini *et al*., 2016; Kumar *et al*., 2021).

Injuries related to cuts with scalpel and needle prick are always encountered probably because of their regular use in most common surgical procedures. These were followed by bites, drug splash and razor with little differences. This finding is in line with the report that Needle stick injury is the most common source of injury among veterinary professionals and most of this needle stick injuries are not reported (Rajendra *et al*., 2002; Weese & Jack , 2008; Mshebuala *et al.*, 2015) Also, out of the categories of occupational hazards among veterinarians, Physical health hazards (injuries) such as animal bites, scratches, needle stick injuries, stampeding on foot and radiation injuries are the most common health hazards (Kumar *et al.*, 2021; Parmar *et al*., 2021). The lower percentage of injury related to orthopaedic mallets might be due to its rare use and mostly by experts in the surgery specialty. In addition most of the moderate to severe orthopaedic cases are performed in high priced pets which are referred to few experts for management.

Although, greater percentage of the respondents believe that proper restraint will be the solutions to these highlighted SII, a holistic approach to the preventive measure was generally recommended. Thus, proper restraint requires the necessary tools (appropriate instruments), adequate assistants (workforce) and improved knowledge of the procedures by the veterinarians through capacity building.

In conclusion, veterinary professionals should prioritize their safety during discharge of their duties. Workshop and seminar attendance for capacity building, such as hands-on in veterinary surgical practice, and maximizing referral opportunities should be emphasized. Governmental and Non-Governmental Organizations (NGOs) through Public Private Partnership (PPP), should introduce interest-free loans for veterinarians to acquire basic instruments. Also veterinary schools should review their curriculum to reflect the present challenges for success of young veterinarians in the fields.

ACKNOWLEDGMENT

The authors wish to acknowledge Nigerian Veterinary Medical Association (NVMA) and their Local Organizing Committee (LOC) at the 55th Annual National Congress, Sokoto, for granting our request for this study to be carried out during such important convention.

CONFLICT OF INTEREST

The authors have declared that they have no conflict of interest.

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