ORIGINAL ARTICLE

Eye Health Workers' Knowledge and Perception of Corona Virus Disease in A Nigerian Eye Hospital

Sebastian NN **NWOSU**[1,2]
Chizoba U **UBA-OBIANO**[1,2]
Adanma C **EZENWA**[1,2]

[1]*Centre for Eye Health Research and Training*
Nnamdi Azikiwe University
Awka, NIGERIA

[2]*Department of Ophthalmology*
Nnamdi Azikiwe University
Guinness Eye Centre Onitsha
NIGERIA

<u>*Author for Correspondence*</u>
Prof Sebastian NN **NWOSU**
Guinness Eye Centre
PMB 1534 Onitsha
Anambra State, NIGERIA

Phone: +234 803 190 7552
Email: sabenwosu@gmail.com

DISCLOSURE
Conflict of interest: None
Financial support: None

ABSTRACT

Background: The novel corona virus disease (COVID-19) is a severe highly infectious viral disease. Health workers, including eye health workers, are expected to take measures to prevent disease spread within the health care facility. Satisfactory performance of the risky duties depends on the workers' knowledge and perception of the disease.

Objectives: To determine the knowledge and perception of COVID-19 pandemic, and any change in these parameters between the first and second waves of the pandemic, among eye health workers at a tertiary eye centre in Nigeria.

Methodology: This study was conducted in two phases in March and December 2020. Eye health workers responded to pre-tested questionnaire on knowledge and perception of COVID-19: disease type, aetiology, disease nature, symptoms, transmission, prevention and fears.

Results: In the first phase, 72 workers participated; 69 in the second phase. All the participants heard of COVID-19 pandemic from multiple sources. Mass media was the commonest source; half of the workers obtained information from the workplace and this did not improve with time; friends, family and the market place as information sources significantly improved with time (p<0.05).

Some workers (7%) did not know the type or mode of spread of COVID-19; 25.0% were ignorant of ophthalmic symptoms. Workers knew that hand washing (93.1%) and equipment disinfection (77.8%) were preventive measures but 38.0% were ignorant of universal precautions concept. All participants expressed fear about contracting COVID-19; fear of nosocomial infections (88.9%) and worry about lack of personal protective equipment [PPE] (50.7%) were most important. Procedures participants mostly wanted suspended were direct ophthalmoscopy (47.5%), slit-lamp examination (30.0%) and tonometry (22.5%).

Conclusion: The knowledge and perception of eye health workers on COVID-19 were suboptimal and these remained essentially unchanged 9 months after. Hospitals should conduct continuing education programmes to deliver accurate information on COVID-19 to the workers.

Key words: *COVID-19, Knowledge, Perception, Eye health worker*

INTRODUCTION

The novel corona virus disease (SARS-nCoV-2; COVID-19) is a severe highly infectious viral disease.[1] First reported in Wuhan, China in late 2019, COVID-19 rapidly spread worldwide. On 30 January, 2020 the World Health Organization (WHO) declared it a disease of public health emergency and on 11 March, 2020 it was declared a pandemic.[1] The incidence of the disease waxes and wanes with the period of increasing incidence being described as 'waves' of the pandemic. COVID-19 affects various organs and systems with major predilection for the respiratory system. The elderly and persons with asthma, diabetes, cancer and hypertension are at greatest risk. Health workers are also at great risk for contracting the disease.

The first case of COVID-19 in Nigeria was reported on 27 February 2020.[2] The disease has since afflicted many persons with fatalities recorded in all parts of Nigeria. As at 27 August 2021, Nigeria had recorded 189,715 confirmed cases with 2,298 fatalities.[3] Indeed, Nigeria has experienced 2 waves of the pandemic and was grappling with the third wave by August 2021.[3] In Anambra State, South-East Nigeria, the first case of COVID-19 was diagnosed on 10 April 2020 and after the first wave of the pandemic, 1 in 6 residents of the state was COVID-19 seropositive.[4] Although all sexes, age groups, settlements and local governments were affected, urban dwellers were more likely to be seropositive.[4] Ageusia (loss of taste) and anosmia were most predictive of sero-positivity.[4]

Apart from pharmacologic and therapeutic management of established cases of the disease, COVID-19 containment approach also includes "lockdown" (severe restriction of social and economic activities by forcing people to stay indoors). Others include non-pharmacologic measures comprising face mask wear, cough etiquette, frequent hand washing, alcohol-based hand sanitizers and social (physical) distancing.

Since it was first reported, COVID-19 has presented serious challenge to the government, the populace and the health-care workforce globally. Health workers, including eye health workers, are expected to take measures to prevent disease spread within the health care facility. Satisfactory performance of the risky duties depends on the workers' knowledge and perception of the disease.

The objectives of the present study were to determine the eye health workers' initial knowledge and perception of COVID-19 pandemic, and any change in these parameters over a 9-month period, between the first and the second waves of the pandemic, at the Guinness Eye Centre Onitsha, Nigeria.

METHODOLOGY

This was a prospective cohort study using the panel studies design.[5] It was conducted in accordance with the Declaration of Helsinki.[6] Only workers actively engaged with clinical duties (outpatients, laboratory, pharmacy, wards and theatre) were included in the study. Participation was voluntary. The consent of each participant was obtained. Participants were assured that any answer they gave would not in any way affect their career in the hospital. Confidentiality of the respondents was strictly maintained.

The questionnaire for this study was reviewed for ethical concerns by the institutional review board of our hospital and approved. Each participant responded to a pre-tested, structured, self-administered questionnaire on knowledge, attitude and perception of COVID-19: disease type and aetiology, nature of the disease, symptoms including ophthalmic symptoms, mode of transmission and spread, ophthalmic procedures likely to

aid disease spread, preventive and protective measures, compliance with the practice of these measures and fears about contracting the disease.

This study was designed and conducted in two phases. The first phase was conducted in March 2020 at beginning of the first wave of pandemic in Nigeria; the second phase was during the second wave of the pandemic in Nigeria in December 2020. Thus in keeping with the study objectives and design, the same questionnaire was administered twice at 9 months' interval, between the first and the second waves of the pandemic.

The information obtained was analyzed using both descriptive and inferential statistics. The differences in the responses in the two phases of the study were compared with the chi square (χ^2) test (and Fisher's exact test as applicable) with alpha at 0.05.

RESULTS

Of 94 workers, 80 were expected to be involved with clinical duties. However, 6 of these were at the time of the study engaged with administrative duties and 2 others were on vacation. These 8 workers did not participate in the study. Thus for the first phase of the study 72 who were involved in clinical duties participated. In the second phase, only 69 participated; one person had retired from service and two others declined further participation. There was no difference between these three and the 69 that participated. There was no formal workshop or seminar to sensitize the staffers on COVID-19 pandemic during this period. Table 1 shows the socio-demographics (age, occupational group & experience) of the participants. The age range was 19 -60 years; median - 38 years; the work experience was one year – 30 years; median - 11 years.

All the participants had heard of COVID-19 pandemic; most heard of COVID-19 from multiple sources implying how seriously the problem was taken in the society. Table 2 shows the workers' source of information on COVID-19. More than 80% of the workers had the mass media as source of information and this did not change with time. Barely half of the workers obtained information on this disease from the work place. While there was a slight increase on the workplace as source of information, this was not significant (p=0.43). On the other hand, there was significant increase in the number of workers who obtained information on COVID-19 from friends, family and the market place during the second phase of the study (p<0.0001). For a health worker, information from workplace is critical. But in this study, the hospital as the primary source of information on COVID-19 was less than expected.

Table 3 shows the workers' knowledge of the type of disease COVID-19 was. In both phases of the study more than 90% of the workers knew that COVID-19 was a communicable disease. However, in both phases of the study, some workers either did not know the type of disease or felt that COVID-19 was a non-communicable disease.

In Table 4 is shown the workers' knowledge of the aetiology of COVID-19. Although the knowledge of disease aetiology did not significantly differ (p=0.83) in the two interviews with more than 90% knowing that COVID-19 was a viral disease, the finding that some workers were ignorant of this even at the second interview is of concern. This is more so when some attributed the cause of the disease to 5G technology – a misinformation probably picked from mass media gossip.

Table 1. Socio-demographic characteristics

	No.	**%**
Age(years)		
≤20	3	4.2
21 – 30	10	13.9
31 – 40	24	33.3
41 – 50	20	27.8
51 – 60	15	20.8
Total	72	100.0
Professional category		
Nurse	21	29.2
Doctor	14	19.4
Optometrist/optician	11	15.3
Health attendants	10	13.9
Pharmacist	9	12.5
Lab scientist	7	9.7
Total	72	100.0
Work experience (Years)		
1 – 5	15	20.8
6 – 10	18	25.0
11 – 15	20	27.8
16 – 20	7	9.7
21 – 25	6	8.3
26 – 30	6	8.3
Total	72	100.0

Figure 1. Suspend procedure
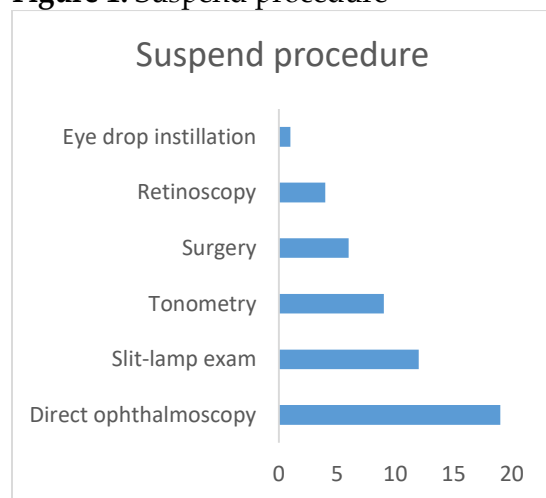
The workers' knowledge of the symptoms of COVID-19 is shown in Table 5. While a high proportion (>80%) of the workers *ab initio* knew of COVID-19 symptoms of cough and fever; in the second phase of the study there was a highly significant improvement in the realization that anosmia, ageusia (loss of taste sense) and diarrhoea constitute important symptoms of COVID-19 (p<0.0001). However, the significantly less number of workers (p=0.018) that considered breathlessness as symptom of COVID-19 in the second interview is surprising. On the other hand, some workers did not know of any symptom of COVID-19 even during the second interview.

As shown in Table 6, the workers had a poor knowledge of ophthalmic symptoms of COVID-19. While a little above half of the workers knew that COVID-19 patients could present with the red eye, nearly a quarter did not know of any ophthalmic symptom of the disease. The knowledge of the ophthalmic symptoms of COVID-19 or lack of it by eye health workers did not change during the two phases of the study (p=0.17).

The workers' knowledge of the mode of spread of the disease is shown Table 7. While more than 90% of the health workers in both phases of the study knew that COVID-19 could be spread by close contact, the knowledge of spread via ophthalmic procedures or instrumentation was poor. The results did not differ significantly in the two phases of the study (p=0.33). However, it is worth noting that while in the first interview 5.6% of the workers had no knowledge of the mode of spread of the disease, in the study's second phase no worker claimed not to have any knowledge of the disease spread.

Table 8 shows the workers' knowledge of possible precautionary measures needed to prevent COVID-19 infection. In each phase of the study, more than 90% of the workers stated that hand washing was a necessary precaution for prevention of COVID-19 infection; however less than 25% were of the opinion that social distancing was an important precautionary measure.

Table 2. COVID-19 Information source (some gave multiple responses)

Information source	1st interview (n = 72) No. (%)	2nd interview (n = 69) No. (%)	χ^2	p-value
Mass media	63 (87.5)	57 (82.6)	0.6650	0.415
Workplace	37 (51.4)	40 (58.0)	0.6158	0.433
Church	18 (25.0)	25 (36.2)	2.0971	0.149
Friend	15 (20.8)	34 (49.3)	12.5701	0.0003*
Family	10 (13.8)	26 (37.7)	10.4901	0.0012*
Market	5 (6.9)	22 (31.9)	14.1551	0.0001*

*Statistically significant

Table 3. Type of disease

Disease type	1st interview (n = 72) No. (%)	2nd interview (n = 69) No. (%)	χ^2	p-value
Communicable	65 (90.3)	65 (94.2)	0.7547	0.385
Non-communicable	2 (2.7)	3 (4.3)	0.4798[F]	0.676
Don't know	5 (7.0)	1 (1.5)	0.1144[F]	0.209
Total	100.0	100.0		

F = Fisher's exact test

Table 4. Disease aetiology

Aetiology	1st interview (n = 72) No. (%)	2nd interview (n = 69) No. (%)	χ^2	p-value
Virus	65 (90.3)	63 (91.2)	0.0444	0.833
Bacteria	2 (2.7)	1 (1.5)	0.5160[F]	1.000
Protozoa	1 (1.4)	2 (2.9)	0.4839[F]	0.614
5G technology	1 (1.4)	1 (1.5)	0.7410[F]	1.000
Don't know	3 (4.2)	2 (2.9)	0.5202[F]	1.000
Total	100.0	100.0		

F = Fisher's exact test

Table 5. General symptoms of COVID-19 (multiple responses)

Symptom	1st interview (n = 72) No. (%)	2nd interview (n = 69) No. (%)	χ^2	p-value
Cough	64 (88.9)	59 (85.5)	0.3614	0.548
Fever	62 (86.1)	63 (91.3)	0.9446	0.331
Breathlessness	62 (86.1)	48 (69.6)	5.6238	0.018*
Fatigue	30 (41.6)	37 (53.6)	2.0198	0.155
Myalgia	22 (30.6)	15 (21.7)	1.4150	0.234
Anosmia	17 (23.6)	43 (62.3)	21.5953	<0.0001*
Ageusia	17 (23.6)	44 (63.8)	23.1475	<0.0001*
Diarrhoea	8 (11.1)	26 (29.6)	13.5932	<0.0001*
Don't know	1 (1.4)	1 (1.5)	0.7410[F]	1.000

F = Fisher's exact test; *statistically significant

Table 6. Eye symptoms (multiple responses)

	1st interview (n = 72)	2nd interview (n = 69)	χ2	p-value
Symptom	No. (%)	No. (%)		
Red eye	41 (56.1)	47 (68.1)	1.8744	0.171
Excessive tearing	20 (27.7)	21 (30.4)	0.1206	0.728
Lid swelling	11 (15.2)	17 (24.6)	1.9396	0.164
Blur	9 (12.5)	16 (23.2)	2.7595	0.097
Don't know	18 (25.0)	17 (24.6)	0.0025	0.960

Table 7. Mode of spread (multiple responses)

	1st interview (n = 72)	2nd interview (n = 69)	χ2	p-value
Spread mode	No. (%)	No. (%)		
Close contact	66 (91.7)	66 (95.7)	0.9366	0.333
Droplets	51 (70.8)	53 (76.7)	0.6506	0.42
Direct ophthalmoscopy	28 (38.9)	28 (40.6)	0.0421	0.837
Slit lamp exam	27 (37.5)	27 (39.1)	0.0396	0.842
Instilling eye drops	21 (29.2)	29 (42.0)	2.547	0.111
Ocular exam	21 (29.2)	18 (26.1)	0.1670	0.683
Tonometry	19 (26.4)	23 (33.3)	0.8124	0.367
Aerosol	19 (26.4)	27 (39.1)	2.602	0.107
Retinoscopy	10 (13.9)	16 (23.2)	2.0261	0.155
Don't know	4 (5.6)	-		

Table 8. COVID-19 precaution (multiple responses)

	1st interview (n = 72)	2nd interview (n = 69)	χ2	p-value
Precaution	No. (%)	No. (%)		
Hand washing	67 (93.1)	65 (94.2)	0.076	0.781
Respiratory hygiene	54 (75.0)	-	-	-
Equipment disinfection	56 (77.8)	52 (75.4)	0.1147	0.735
Facial protection	47 (65.3)	54 (78.3)	2.9226	0.087
Environmental cleaning	35 (48.6)	31 (44.9)	0.2005	0.654
Protective personal equipment	44 (61.7)	16 (23.2)	20.7283	<0.0001*
Social distancing	16 (22.2)	16 (23.2)	0.0187	0.891

*Statistically significant

It also interesting that while at the first phase of the study 75% of the workers considered maintaining good respiratory hygiene/cough etiquette important precautionary measure, none did so during the second phase of the study; similarly, between the two phases of the study there was a significant difference (p<0.0001) in the opinion of participants with regard to personal protective equipment [PPE] as a precautionary measure. But it bears to note that all theatre and laboratory workers in both phases of this study considered PPE an important precautionary measure. None of the workers had used PPE which was not available in the hospital during the study period. While in the first phase of the study, 27 out of 72 (38.0%) participants never heard of the concept of universal precaution, this poor knowledge persisted in the second phase with 25 of 69 (36.2%) respondents still ignorant of the concept (p=0.88).

In both phases of the study, all the workers expressed worry about contracting COVID-19 in the workplace. The most important sources of worry were fear of nosocomial infections

and lack of PPE especially for theatre and laboratory workers as well as those performing ocular examinations. While the worry about lack of PPE increased in the second interview (41.7% versus 50.7%), the fear of nosocomial infections significantly decreased (88.9% versus 52.2%) in the second interview (p<0.0001). The protective device available to eye health workers (including those performing surgery) during this period were face mask, hand gloves and sanitizers.

In the first phase of the study, no worker was certain about which clinical procedure to suspend. However, in the second phase 40 (58.1%) workers wanted some procedures suspended. Of these nearly half wanted direct ophthalmoscopy suspended. Details are shown in Figure 1.

DISCUSSION

The advent of COVID-19 pandemic in Nigeria was greeted with panic; there was confusion as to how best to prevent the spread of the disease and the best care approach for the afflicted. All these emanated from the lack of understanding and clear information on the natural history of the disease. Vaccines were then not available and definitive cure elusive for this highly contagious disease. At this point it was expected that the hospital would intervene and educate and also regularly update the workers on the emerging pandemic based on scientifically available information. But as found in this study, the primary source of information for most eye health workers was not from any formally organized education and sensitization program by the hospital.

The uncertain situation was made worse by a plethora of conspiracy theories and misinformation. Some people believed that COVID-19 infection was a hoax; others felt it was an evil design to depopulate the world

using among others what was called "5G technology". Much of the misinformation was alive in the social media and other non-medical sources. Alternative views about the pandemic ranging from a denial of its existence through its being white man's disease prevailed even among health workers as found in the present study. Thus not many people took seriously the COVID-19 preventive guidelines put out by the Nigeria Centre for Disease Control (NCDC)[7], the World Health Organization[8] and other healthcare professional bodies[9-13].

Health workers are expected to be more knowledgeable than the populace about COVID-19. Such precise knowledge would enable them function safely while caring for patients and in turn minimize spread of the disease in the workplace. For an emerging pandemic the knowledge of its natural history is expected to improve over time especially among health workers. New information on the clinical manifestations and management of the disease based on the results of scientific research is expected to be acquired by the health workers as part of continuing professional development. However, whether this notion was true of eye health workers was unclear. The need to fill this information gap was the *raison d'etre* for this study.

Surprisingly the results of the present study generally suggest a lack of improvement in the knowledge, and perception of COVID-19 pandemic over a 9-month period by the eye health workers. From multiple sources and within one month of its debut in Nigeria all the workers heard of the pandemic. But the major information source (>80%) remained the mass media with barely 50% of the workers obtaining the information at workplace; nine months into the pandemic with the second wave raging, some eye health workers still did not know of the aetiology, disease type and major symptoms of COVID-19 disease. It was

by the panel studies (a type of cohort study) approach that this defect could be detected.[6]

It could be argued that some of those interviewed were health attendants with limited medical knowledge. However, it is important to emphasize that in spite of lack of medical training, health attendants require regular simple, targeted health education to enable them perform their duties safely in the hospital environment; by nature of their duties these cadre of health workers often handle patients' materials including in some cases patients' effluents which may be infectious. A reasonable proportion of the present cohort feared spread of nosocomial infection which could be prevented by adopting universal precautions especially by health attendants. But more than a third of the workers were ignorant of the concept of universal precautions.[14]

An interesting finding was that during the second phase of the present study no worker considered respiratory hygiene (with associated cough etiquette) an important COVID-19 spread preventive measure. As the first wave of the pandemic waned, social restrictions and other non-pharmacologic approaches to disease containment were no longer strictly adhered to. The second phase of our study was conducted during this period – at the beginning of the second wave of the pandemic. If the eye health workers did not consider this vital route of infection spread important, then the campaign for disease containment among the general public will require more vigorous effort.

During the period of this study and in spite of the importance attached to containment of COVID-19 in Nigeria by the Federal and state governments, there was no formal educational forum organized to teach and sensitize the eye health workers in this cohort. When these workers relied mainly on mass media for health-related information, their knowledge, attitude and perception would inevitably be sub-optimal as found in the present study. At the inception of COVID-19 pandemic in Nigeria, the NCDC rolled out preventive and management guidelines which were expected to be cascaded down to health workers and the public.[7] Indeed based on this and the principles of universal precautions, in May 2020, the Lagos University Teaching Hospital published guidelines aimed at protecting eye health workers and ophthalmic patients during the pandemic.[15]

The results of the present study are not different from the findings in ophthalmic patients interviewed in the same hospital during the same period.[16] It is worrisome that more than a third of the eye health workers never heard of universal precautions.[14] In a country in which many infectious diseases including Lassa fever are endemic, prevention of infectious disease spread should be of utmost concern to all. It is therefore recommended that hospitals regularly conduct health education sessions for workers with a view to helping them to acquire new knowledge and also consolidate the existing knowledge to enable them cope with their duties more efficiently.

Indeed, every hospital should establish or re-activate existing but moribund health education unit with the aim of attending to the work-related health education needs of its workers. Hospitals should always be pro-active in promoting workers' safety by formally organizing regular training sessions and releasing health information bulletins intermittently on topical health issues. The unsatisfactory findings in the present study may be the tip of the iceberg. There is need to regularly train and evaluate the knowledge and skills of the health care workers on life-saving techniques such as cardio-pulmonary

resuscitation and preparedness for management of mass casualties.[17]

Nearly a quarter of the eye health workers did not know the ocular features of COVID-19 infection although most of these workers were aware of the general (systemic) symptoms of the severe disease. This may be related to the fact that confirmed cases of COVID-19 infection do not present primarily to the eye health worker. However, it should be borne in mind that COVID-19 in its early stage (without severe systemic symptoms and signs) is very contagious. Indeed, patients at this stage are regarded as 'super spreaders' of the disease. At this early stage such patients could present with the ocular inflammation or retinal changes.[18,19,20] Therefore, it behooves every eye health worker to have a high index of suspicion based on good knowledge of the ophthalmic features of COVID-19. This is necessary for early detection and referral in order to minimize spread from unsuspected cases and also to protect the workers.

The fear of the disease was palpable. This fear was worsened by the lack of PPE for surgical theatre workers as well as absence of local hospital guidelines. The eye health worker needs optimal mental health to function well in the COVID-19 era.[21] Therefore, apart from counselling, the workers need definite guidelines and the relevant work tools to spur their confidence and stabilize them psychologically. Similarly, it is instructive that at the first phase of the study no worker suggested the suspension of any aspect of ophthalmic patient care. However, because of fear of contracting COVID-19 infection against the backdrop of perceived inadequate personal protection, many workers wanted all procedures involving close contact with the patients to be suspended (Figure 1).

It would have been interesting if an intergroup comparison of the knowledge and perception of various cadre of eye health workers was performed. But this was not done due to the small number of the different cadres interviewed. A multi-centre study involving a larger number of eye health worker is thus recommended as such analysis will provide a good data base that will help in designing education programmes for the different cadres of workers.

CONCLUSION
While many eye health workers were aware of the COVID-19 pandemic in Nigeria, 25% did not know the ocular manifestations. There is also a huge knowledge gap as eye health workers in the second wave did not consider respiratory issues as a manifestations of COVID-19. Continuous education of the workers on basic safety measures including knowing the various manifestations of the pandemic is recommended. Health care institutions should therefore give continuing health education of its workers on COVID-19 pandemic the necessary priority.

REFERENCES
1. World Health Organization. Timeline: WHO's COVID-19 response. Available at https://www.who.int/emergencies/disea ses/coronavirus disease (COVID-19)/Timeline: WHO"s COVID-19 response. [Accessed: 14 August 2020]
2. Nigeria Centre for Disease Control. First case of coronavirus disease confirmed in Nigeria. https://covid19.ncdc.gov.ng. [Accessed: 10 March 2020]
3. Nigeria Centre for Disease Control. Update on COVID-19 cases in Nigeria. Available at https://covid19.ncdc.gov.ng. [Accessed: 27August 2021].
4. Okpala OV, Dim CC, Ugwu CI, Onyemaechi S, Uchebo O, Chukwulobelu U, *et al*. Population seroprevalence of SARS-CoV-2 antibodies in Anambra State, South-East Nigeria. *International Journal of Infectious Diseases* 2021; 110: 171-178. https://doi.org/10.1016/j.ijid.2021.07.040

5.   Kelsey JL, Whittemore AS, Evans AS, Thompson WD. Methods in observational epidemiology. 2nd Edition. Oxford: Oxford University Press 1996: 257-278.

6.   Rid A, Schmidt H. The 2008 Declaration of Helsinki - first among equals in research ethics. *J Law Med Ethics* 2010; 38:143–148.

7.   Nigeria Centre for Disease Control. Update on COVID-19 cases in Nigeria one year after: Nigeria's Ccovid-19 Public Health Response February 2020–January 2021. Available at. https://covid19.ncdc.gov.ng. [Accessed: 27 August 2021}

8.   World Health Organization. Coronavirus disease (COVID-19) advice for the public. Available at https://www.who.int/emergencies/diseases/coronavirus disease (COVID-19)/Advice for the public. [Accessed: 14 August 2020].

9.   American College Surgeons. COVID-19 guidelines for triage of ophthalmology patients. Available at https://www.facs.org/COVID-10 clinical guidelines. [Accessed: 04 May 2020]

10. American Academy of Ophthalmology. Eye care during coronavirus (COVID-19) pandemic. Available at https://www.aao.org>tips-prevention. [Accessed: 25 May 2020]

11. Royal College of Ophthalmologists. PPE and staff protection requirements for ophthalmology. Available at https://www.Rcophth.ac.uk/wp-content/upload/2020/04/UPDATE D-RCOphth-PPE-for ophthalmology-090420.pdf. [Accessed 03 May 2020]

12. International Agency for Prevention of Blindness. COVID-19 and Eye Health. Available at https://www.iapb.org>

13. The College of Optometrists. COVID-19: College updates - College clinical guidelines. Available at https://www.college-optometrists.org/covid-19/clinical guidelines. [Accessed: 14 August 2020]

14. Broussard IM, Kahwaji CI. Universal precautions. (Updated 2020 Dec 20). In: StatPearls (Internet). Treasure Island (FL): StatPearls Publishing; 2021 Jan-.

15. Onakoya A. COVID-19: Adaptations and changes at Guinness Eye Centre Nigeria. *Community Eye Health Journal* 2020; 33(109): 14-15.

16. Nwosu SNN, Ezenwa AC, Uba-Obiano CU. Ophthalmic patients' perceptive on corona virus disease (COVID-19) pandemic in Onitsha, Nigeria. *Niger J Ophthalmol* 2021; 29: 34-38.

17. Nwosu SNN. (Ed.). NAUTH Emergency Care Handbook. Booksmith House, Nimo: Rex Charles & Patrick Ltd. 2014:374p.

18. Gupta A, Madhavan MV, Sehgal K, Nair N, Mahajan S, Sehrawat TS, *et al*. Extra-pulmonary manifestations of COVID-19. Nature Medicine 2020; 26: 1017-32.

19. Seah I, Su X, Lingan G. Re-visiting dangers of the coronavirus in ophthalmology practice. *Eye* 2020; 34: 1155-1157.

20. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, Wu K. Characteristics of ocular findings of patients with coronavirus disease 2019 (COVID-19) in Hubei Province, China. *JAMA Ophthalmol* 2020; 138: 575-578.

21. Eaton J. Well-being and mental health during COVID-19 outbreak. *Community Eye Health* 2020; 33(109): 8-9.

Resources>knowledge. [Accessed: 14 August 2020].