A Comparative Study on The Effect of Covid-19 Pandemic on Patient Flow, Attendance and Disease Pattern at University Teaching Hospitals - Eye Hospital Between Quarters Two of 2019 and 2020

Paulina Ndeshipanda Lineekela Munalye[1*], Kangwa I. M. Muma[1]

[1]School of Medicine, Cavendish University, Lusaka Zambia

**Author correspondence*

Abstract:

***Background*: The COVID-19 pandemic has had a significant effect on patient flow, attendances, disease pattern, and routine healthcare due to hospitals being unable to manage surges of patients coming with infection while providing normally-planned and scheduled healthcare services simultaneously.**

***Purpose*: To evaluate the effect of COVID-19 pandemic on patient flow, attendances and disease pattern at University Teaching Hospitals - Eye Hospital (UTHs-EH) between quarters two of 2019 and 2020.**

***Methods*: A Hospital based descriptive non-interventional, retrospective cross-sectional study was conducted utilizing the records of patients that were seen at the UTHs-EHs during quarters two of 2019 and 2020.**

***Results*: Research findings showed that a total of 7,088 patients attended the Eye Hospital in quarters two of 2019 and 2020, of which 5,658 patients were attended to in 2019, compared to 1,430 in 2020 representing a reduction of 74.7%. In quarter two of 2019, the re-attendances were 3,440, while only 966 were re-attendances in quarter two of 2020 during the COVID-19 pandemic, giving a reduction of 71.9%. The same trend was observed for new cases, with 2019 quarter two recording 2,218, compared to 464 in 2020 quarter two, representing a decline of 79.1%. A total of 1,469 female patients were attended to with top ten conditions in quarter two of 2019, compared to 222 in quarter two of 2020, representing a decline of 84.9%. Similarly, the male patients attended to with top ten conditions dropped from 1,000 in quarter two of 2019 to 120 in quarter two of 2020, giving a decline of 88.0%. Refractive Error was the most prevalent condition, with 1,523 and 129 patients seen in quarters two of 2019 and 2020 respectively, giving a decline of 91.5%. A total of 748 surgeries were performed between the two periods under review of which, 487 were performed in quarter two of 2019, compared to 261 performed in quarter two 2020 which was a decline of 46.4%. Conclusion: The COVID-19 pandemic led to a remarkable decline in patient flow, attendances and disease pattern at UTHs-EH, between the two periods under review. On the other hand, negative consequences arising from disruption of ophthalmological clinical flow, attendances and disease pattern remain to be seen.**

***Key Words*: COVID-19, Pandemic, Ophthalmology, Eye health services**

I. INTRODUCTION

The COVID-19 pandemic has altered health care delivery and has had a significant effect on patient flow, attendances and disease pattern due to Hospitals being unable to manage surges of patients arriving with infection while providing routine healthcare at the same time. Handling and organizing patient flow has been a critical challenge faced by the health sector, now made even worse by the Coronavirus crisis, as it poses a huge risk to disease transmission. Zambia documented its first two COVID-19 cases on 18th March 2020, and cases have been subsequently on the rise ever since.[1]

As the population of COVID-19 positive cases rises, infected patients' frequency to health care facilities such as the ophthalmologist office, Eye clinics and emergency departments may increase as they seek a myriad of health services. The health sector is the most affected as it is at the epicenter of dealing with the virus [2,3,4], therefore, different health departments have implemented several measures to prevent and control the spread of the pandemic and to manage patient flow. Some of these measures included lessening face-to-face visits, only conducting urgent and emergency procedures during the pandemic and putting routine eye appointments and clinic reviews on hold.[5]

Case management therefore is critical in controlling patient turn up, in-flow and outflow in the Hospital through case identification, adherence to admission criteria, scheduling, routine care services, providing information and decision making.[6] However, if not handled properly, this may lead to unnecessary delays and untold misery to people who need life-saving medical procedures, such as those harboring a threat of loss of vision or those with a potential to be cured, for example emergency surgery, urgent transplantation, and cancer treatment.[7] It is therefore not possible to entirely defer or delay all services as this will unintentionally produce undesirable morbidities and mortalities that would have been prevented if they were addressed earlier.

Major surgeries in ophthalmology are described as any invasive intraocular procedure that involves either extensive resection, or requires general anesthesia or lasts longer than 90 minutes, examples include cataract surgery, evisceration, exenteration and enucleation. A minor surgery in ophthalmology is defined as any minimally invasive excision procedure that is superficial where mucous membranes, skin or connective tissue is operated on, it involves minimal intervention and access of a limited operative site and are mostly carried out under local anesthesia. It can be therapeutic or diagnostic in nature and include papilloma, and cyst removal.

There is inadequate data on the effect of COVID-19 on patient flow, attendances and disease pattern and its impact on case management and service delivery among the major referral Hospitals in Zambia, hence the need to conduct the study. Pandemic outbreaks frequently threaten both social organizations and healthcare services. However, the impact of COVID-19 on health services is not well documented in literature. What is known today is mainly due to past pandemics, recent brief articles, and the media.

Pandemics cause circumstances that can alter normal conditions. Even though pandemics often lead to the creation of strategic crisis centers, these are not without impact, especially because health facilities are often lacking resources, not well equipped and inadequately prepared, therefore these gaps make them quite susceptible.[8]

The evidence shows that pandemics produce increased pressure on health professionals, generate an increased demand, and thus heavily impact the delivery of health services.[9, 10] Pandemics also create an impact on the population's behavior. Community participation and commitment also poses a challenge to the treatment and effective implementation of programmes, as some patients may stay at home or seek traditional medicines owing to fear of being infected with the Coronavirus, with others opting to seek services only when a very serious condition has developed.[11]

This study provides a prospect to re-evaluate the current systems in place and help to identify any inadequacies in workflow and discrepancies in eye health care delivery that may currently be in existence. Additionally, the findings may help inform strategies and interventions aimed at improving ophthalmological services in case another pandemic erupts.

II. METHODS

This study was conducted at the University Teaching Hospitals - Eye Hospital in Lusaka, Zambia, which is a tertiary referral center in Zambia with good record keeping and also a training site for medical students. This study was a Hospital based retrospective cross-sectional, non-interventional descriptive survey, done utilizing quantitative aspects of the records of all eye patients seen at the UTHs-EH during quarters two of 2019 and 2020. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Comparison between the total numbers of patients that visited the Hospital, was analyzed using frequencies and presented using graphs. Furthermore, disease patterns were analysed, by calculating the top 10 diseases for both periods under review, and further expressed comparatively using the following variables: age groups and sex in tables. Purposive sampling procedure was employed and data was collected using a research tool.

Statistical Analysis

The data was entered and stored in Microsoft Excel version 2013. After it was cleaned, it was exported into SPSS version 20. Comparison between the total numbers of patients attended to, were analyzed using frequencies and presented using graphs. Furthermore, disease patterns were analysed, by calculating the top ten diseases for both periods under review, and further analysed by comparisons for the following variables: age groups and sex. Double entry was performed to ensure the accuracy of the data analyzed.

Ethical Considerations

Clearance and Ethical approval were obtained from the Levy Mwanawasa Medical University Research Ethics Committee (REF. No. LMMU-REC 00009/20). Further approval was sought from the National Health Research Authority (Ref No: NHRA00003/17/03/2021). Permission was also sought from University Teaching Hospitals - Eye Hospital Management. All information collected during all stages of research was handled with strict confidentiality and was only used for the purpose of this research. All patients' information was securely kept, and only the principal investigator had access to it.

III. RESULTS

The study findings showed that a total of 7,088 patients attended UTHs-EH in quarters two of 2019 and 2020. The UTHs-EH in quarter two of 2019 attended to 5,658 patients, compared to 1,430 in quarter two of 2020, which was a decline of 74.7% of the 2019 attendances.

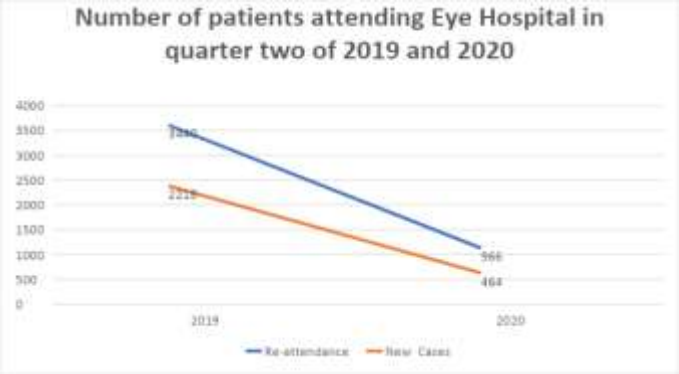

Figure 1: Number of patients attended to at Eye Hospital in quarters two of 2019 and 2020

The research findings showed that there were more patients attending the UTHs-EH before COVID-19 outbreak, and that the number drastically reduced during the outbreak. In quarter two of 2019, the re-attendances were 3,440, while only 966, were re-attendances in quarter two of 2020 during the COVID-19 pandemic giving a reduction of 71.9%. The same trend was observed for new cases, with 2019 quarter two recording 2,218, compared to 464 in 2020 quarter two representing a decline of 79.1%.

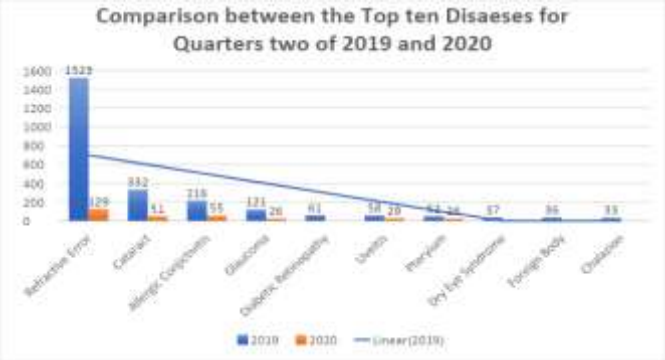

Figure 2: Top 10 Diseases at Eye Hospital in quarters two of 2019 and 2020

The research findings showed that refractive error was the most prevalent condition, with 1,523 and 129 patients attended to in quarters two of 2019 and 2020, respectively showing a decline of 91.5%. Additionally, Cataract and allergic conjunctivitis were second and third, respectively for both periods under review. On the other hand, Chalazion was the least condition with 33 and 0 for quarters two of 2019 and 2020 respectively. Cataract patients declined from 332 in quarter two of 2019, to 51 in quarter two of 2020 giving a reduction of 84.6%.

Table 1: Top Ten Disease Patterns by Sex of Patients, n = 2,811

Conditions	Female		Male		TOTAL	
	2019	2020	2019	2020	2019	2020
Refractive Error	967 (65.8)	86 (38.6)	556 (55.6)	43 (35.9)	1523	129
Cataract	178 (12.1)	33 (14.9)	154 (15.4)	18 (15.0)	332	51
Allergic Conjunctivitis	135 (9.2)	39 (17.6)	81 (8.1)	16 (13.3)	216	55
Glaucoma	51 (3.5)	17 (7.7)	70 (7.0)	9 (7.5)	121	26
Diabetic Retinopathy	24 (1.6)	0	37 (3.7)	0	61	0
Uveitis	25 (1.7)	16 (7.2)	33 (3.3)	13 (10.8)	58	29
Pteryium	39 (2.7)	17 (7.7)	13 (1.3)	9 (7.5)	52	26
Dry Eye Syndrome	22 (1.5)	0	15 (1.5)	0	37	0
Foreign Body	7 (0.5)	14 (6.3)	29 (2.9)	12 (10.0)	36	26
Chalazion	21 (1.4)	0	12 (1.2)	0	33	0
TOTALS (N= 2811)	1,469 (100)	222 (100)	1,000 (100)	120 (100)	2469	342

Table 1, above shows that the hospital attended 1,469 female patients in quarter two of 2019 compared to 222 in quarter two of 2020, which was a reduction of 84.9% of the 2019 attendances. Similarly, there were more male patients (1000) attended to in quarter two of 2019, compared to 120, that were seen in quarter two of 2020 which was a reduction of 88.0%.

Table 2: Top Ten Disease Patterns by Age Groups, n = 2,811

CONDITIONS	QUARTER TWO 2019		QUARTER TWO 2020	
	<15	≥ 15	<15	≥ 15
Refractive Error	185 (59.7)	1338 (61.7)	49 (35.5)	80 (40.6)
Allergic Conjunctivitis	53 (17.1)	163 (7.5)	30 (21.7)	25 (12.7)
Diabetic Retinopathy	33 (10.6)	28 (1.3)	0	0
Cataract	12 (3.9)	323 (14.9)	16 (11.6)	32 (16.3)
Foreign Body	12 (3.9)	27 (1.2)	9 (6.5)	14 (7.1)
Chalazion	8 (2.6)	25 (1.3)	0	0
Glaucoma	5 (1.6)	117 (5.4)	11 (8)	14 (7.1)
Dry Eye Syndrome	1 (0.3)	36 (1.7)	0	0
Uveitis	1 (0.3)	57 (2.6)	15 (10.9)	14 (7.1)
Pteryium	0	52 (2.4)	8 (5.8)	18 (9.2)
Grand Total (N=2811)	**310 (100)**	**2,166 (100)**	**138 (100)**	**197 (100)**

The research findings revealed that there were more patients, 91.0% (n=2166), aged 15 years and above seen in quarter two of 2019, compared to 8.3% (n=197), seen in quarter two of 2020.

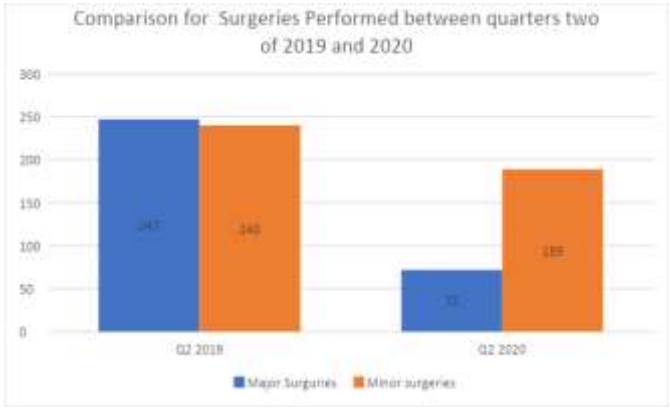

Figure 3: Comparison for total Surgeries performed between quarters two of 2019 and 2020

A total of 748 surgeries were performed between the two periods under review. Furthermore, there were more surgeries, 46.4% (n= 487), performed in quarter two of 2019, compared to 35.0% (n=261) performed in quarter two of 2020. The number of minor surgeries reduced from 247 in quarter two of 2019, to 72 in quarter two of 2020, indicating a 71.0% drop. While the number of minor surgeries reduced from 240 in quarter two of 2019, to 189 in quarter two of 2020, indicating a 21.3% decline.

IV. DISCUSSION

This was a cross sectional descriptive study conducted at the University Teaching Hospitals-Eye Hospital, comparing the patient flow, attendances and disease pattern in quarters two of 2019 and 2020. A total of 7,088 patients attended the UTHs-EH in the two periods under review, of which 5,658 patients were seen in quarter two of 2019 and 1,430 patients were seen in quarter two of 2020. The study demonstrated a 74.7% reduction of patients attended to in 2020, showing that the COVID-19 pandemic had a serious effect on eye health service delivery at the UTHs-EH. This finding is similar to what was found in USA and Iran, where they reported a high reduction of patients attended to at Eye Facilities following the outbreak of the COVID-19 pandemic as in-person ophthalmology visits fell by 88.0% at an eye clinic in Massachusetts United States and outpatient load being decreased to almost 58.0% of its load in Iran.[10, 12] Additionally, Pellegrini et al. (2020), observed that the number of visits dropped sharply after the COVID-19 outbreak.[13]

In this study 1,469 females were attended to with top ten conditions in quarter two of 2019 compared to 222 in quarter two of 2020, showing a massive reduction in female patients attended to 84.9% in the 2020 quarter two statistics. Similarly there was a reduction in males patients attended to by 88.0% in 2020. Furthermore, the research findings showed a decline of 91.0% of patients aged 15 years and above who were seen in quarter two of 2020. Similarly, the patients with refractive error aged 15 years and above declined by 91.5%. Other studies have reported similar findings as there was a notable difference in average age of patients attending the retina clinic as older patients were seen in quarter two of 2020, as compared to 2019.[14] This may have been due to older patients having more serious eye conditions needing urgent personal attention compared to younger patients. This may also be due to older patients not being well acquainted with digital telemedicine and video consultations.

A study conducted in India, reported that the total number outpatients seen before and after COVID-19 had a reduction, averaging 2556.6 and 85.8 visits per day.[15] The impact of this drop, while understood, may pose serious public health threats with respect to disease burden, timely health seeking behavior and reduced quality of life among the people.

This observation aligns with a study conducted by Sethi et al. (2021), where it was posited that; reduction in outpatient volume, increases the chances of high-risk patients not receiving adequate treatment.[10] This brings about a dilemma as there is a need to deliver eye services and rescue vision, but there is also a high risk of transmitting and acquiring COVID-19 while doing so, thus decisions over managing patients in-person, should be heavily weighted regarding patients conditions individually.

Furthermore, health facilities implementing COVID-19 preventive measures should ensure to factor-in, the opportunity cost of such interventions with respect to patient flow, attendances and disease pattern, as well as timely management of patients in need of health services. The reduction in the number of visits could be attributed to the 'stay-at-home' or 'lockdown' measures put in place by various governments and implemented by institutions. Measures such as the campaign to stay-home may have aided reduced Coronavirus spread, but subsequently caused a reduction in Hospital visits which could have brought about complications and consequences, as a result of patients not being seen. On the other hand, there is a notable public health threat; that reduced access to eye services may inflict harm upon people, for example, avoidance of the health setting due to fear of COVID-19 infection may lead to a high likelihood of permanent vision loss or advancement in cancer.[13]

In terms of disease patterns for quarters two of 2019 and 2020, the study showed that, among the top ten conditions, refractive errors was number one across both periods. However, there was a marked reduction of the cases by 91.0% in quarter two of 2020. The situation was the same across all other conditions in the top ten list of conditions, as there was a marked reduction in all these conditions. On the other hand, similar studies have shown conditions such as Uveitis, diabetic retinopathy and ocular inflammation as the most prevalent conditions in other countries across both periods. A study conducted in Singapore and New Delhi observed that, diabetic retinopathy and uveitis were common in India, whereas cataract and glaucoma were common in Singapore during the pandemic.[16] This shows that disease patterns vary from one place to another due to the pandemic. This implies, therefore, that while the trend is similar across all the places, clinical intervention should be adaptive in nature based on the most prevalent condition/s. It is therefore important for eye health systems or set ups to observe the eye health disease trends and patterns as the pandemic is evolving, for effective planning and tailored solutions as the trends and patterns may keep on changing with the evolution of the pandemic.

Surprisingly, the study at UTHs-EH observed that; there were no cases for the following conditions in quarter two of 2020; Diabetic retinopathy, Dry eye syndrome, foreign body and Chalazion. This is in contrast with current research that asserted that; among people with COVID-19, 1 in 10 developed conjunctivitis, chronic dry eye and uveitis.[17] While this observation is true, on the other hand, Zambia's Ministry of Health had implemented COVID-19 treatment centres where such similar observations could be made. However, the study site for the current study was not among those treatment centres at the time.

The major surgeries reduced to 71.0% in quarter two of 2020 compared to quarter two of 2019. The minor surgeries on the other hand, the reductions were not very high at 21.3%. Other authors reported the same findings showing that cataract surgeries, intravitreal injections, and retinal laser procedures, decreased by 99.7%, 98.7% and 96.5% according to Babu et al. (2021), during the COVID-19 pandemic peak.[15] A study

conducted by Wood et al. (2021), posited that there was a large decrease in pediatric ophthalmic surgery as only 6 surgeries were performed during the pandemic period, in comparison, 66 surgeries were performed in the same period in 2019. This therefore meant that a total of 45 booked surgeries were postponed in that period.[18] Additionally, a recent study documented a substantial decrease in Hospital visits across five Italian Hospitals during the lockdown.[19] The major reasons attributed towards the drop in Hospital visits included, public health measures implemented to combat the pandemic, and fear of infection among people.

V. CONCLUSION

The COVID-19 pandemic led to a marked reduction of eye health service delivery at the University Teaching Hospitals-Eye Hospital in 2020, due to the imposed COVID-19 measures implemented by Zambian Government and resulted in a fall in the number of patients attended to, as in other clinics in different countries. The disease pattern was also significantly distorted resulting in a reduction of cases for conditions such as Diabetic retinopathy, Dry eye syndrome, foreign body and Chalazion. The disease profile is yet to be analyzed as the negative consequences and burden arising from disruption of ophthalmological clinical flow, attendances and disease pattern remain to be seen, and long-term complications arising from urgent conditions such as diabetic retinopathy, hypertensive retinopathy and glaucoma can only be ascertained after a certain period. The impact of this drop, while understood, may pose serious public health threats with respect to disease burden, timely health seeking behavior and reduced quality of life among the people. It is therefore imperative to strike an equilibrium between the requirement to deliver eye services and rescue vision versus the risk of acquiring COVID-19, thus this should be heavily weighted regarding patients individually.

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Conflicts of Interest

There are no conflicts of interest.

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