Restorative Dental Care and COVID-19 Pandemic: Reviewing the Treatment Guidelines and Evaluating Patients' Opinion Qualitatively in a Nigerian Tertiary Hospital.

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Abstract

Objectives: The study aimed at reviewing the different measures and strategies put in place globally to ensure successful management of restorative dental patients during the COVID-19 era and to evaluate the knowledge and information on patients' opinion on the impact of the pandemic on their restorative care through a qualitative study design.

Methodology: Search for articles on guidelines for restorative care through PUBMED using the keywords COVID-19, guidelines, protocols and restorative care was done. About 42 related articles were downloaded and appraised for necessary information as regards standard protocols in restorative care. The qualitative study involved individual interview of randomly selected 15 patients seeking restorative care that consented to participate in the study. The audiotaped interviews were transcribed verbatim and thematic analysis of data generated was done. Four themes were identified from the data and these included knowledge about COVID-19, view about the infection and infection control, the effects of the lockdown on treatment as well as the fear about contracting the disease.

Result: Standard guidelines for different phases (pre, intra and post treatment) were carefully outlined. Fifteen patients, 8 females and 7 males between ages 19 and 72 years with mean age of 39.6 ±17.53 years were interviewed. All the patients had knowledge about COVID-19 infection but the majority were not familiar with the relationship between dentistry and spread of the infection. Repeated visits to dental clinic without being attended to, during the lockdown resulted in patients using self-medication. The fear of contracting the infection in dental clinic was low among the participants and the few that had the fear were those that showed good knowledge about the risk of contracting COVID-19 infection through restorative care.

Conclusion: Strict adherence to standard protocols and guidelines should always be followed even after COVID-19 pandemic to ensure continual confidence of patients in the clinicians.

Keywords: COVID-19 pandemic, Restorative care, Patients' opinion, Qualitative study

Introduction

A pandemic rarely occurs, but when it does, it comes with catastrophic consequences, including global economic downturn as being currently faced worldwide by the insurgence of coronavirus disease 2019 (COVID-19). The novel, highly infectious disease transmitted through droplets spread[1], initially causes mild respiratory symptoms which may progress to severe respiratory distress with complications and eventual death[2,3]. It is known to be

caused by severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) which is a single stranded RNA virus with its host receptor being the human angiotensin-converting enzyme 2 (ACE 2). It was first discovered in December 2019 in Wuhan, China and was declared a pandemic by the World Health Organization (WHO) in March, 2020, owing to its ravaging spread worldwide. According to the WHO, this is the first pandemic caused by a corona virus[4]. The burden of the disease is such that as at August 6, 2020, almost 19 million cases and more than 710 thousand deaths have been recorded globally, with 188 countries already affected. In Nigeria, the number of people affected by the disease is over 44 thousand, with 927 deaths[5].

The emergence of COVID-19 has had a huge impact on the practice of dentistry globally, most especially those aspects of dental practice that involve aerosol generating procedures. Such aerosol-generating procedures are daily encountered in various dental specialties, particularly restorative dentistry. It was published in the New York Times on 15th March, 2020 that dentists tend to have higher risk of contracting the virus more than nurses and medical practitioners because they have closer contacts with patients[6]. Also, the dental team becomes more at risk because of exposure to aerosol generating procedures[7,8]. It is also interesting to note that COVID-19 virus receptor, the ACE 2 is highly concentrated in the salivary gland, thus possibly explaining the reason for the presence of SARS-COV-2 in secretory saliva[9].

Restorative dentistry is an important aspect of dentistry that has evolved over the years with concomitant positive psychosocial benefits to patients. This specialty deals with restoring the form, colour and function to a damaged or malformed tooth as well as replacing the missing ones. Restorative procedures include replacement, rehabilitative, aesthetic and endodontic therapies. Replacement of diseased part of a tooth or the entire tooth/teeth lost to various diseases such as dental caries, periodontal diseases, non-carious tooth wear lesions as well as cancers, could all be achieved through restorative procedures such as dental fillings, partial and full removable dentures, fixed partial dentures, implant- retained and maxillofacial prostheses. Aesthetic dentistry involves skills and techniques to improve patient's smile's appearance, shape, colour, alignment and size of teeth as well as the overall health and function of the teeth. Procedures that improve the appearance of the teeth such as veneering, crowning and tooth bleaching have helped to promote social acceptance of patients. Furthermore, endodontics is a branch of restorative dentistry concerned with the diagnosis, treatment and prevention of the diseases of the dental pulp and its surrounding tissues.

Several teeth are being prevented from extractions nowadays, owing to restorative procedures which could be aerosol and non-aerosol generating procedures. These aerosols are of two types namely; droplets and droplet nuclei. The droplets are larger (>5μm) and may travel about a metre before landing while the droplet nuclei (1 - 5 μm) can stay airborne for longer period before landing and contaminating surfaces[9]. The SARS CoV- 2 may be transmitted by the two types since it results from direct air borne infection and indirect spread through contaminated surfaces.

The aerosol-generating procedures (AGPs) in restorative dentistry include those requiring the use of 3-in-1 syringe, high speed handpieces and sonic or ultrasonic scalers. Examples of non-AGPs are dental examinations not utilizing 3-in-1 syringe, impression making, tooth bleaching and removal of dental caries by hand excavation or the use of slow handpieces.

With the insurgence of the COVID-19 pandemic, the performance of most dental procedures have been hampered with avoidance of aerosol generating procedures to contain the spread of the virus at the same time protect the health and safety of people[10]. This article, therefore, aimed at reviewing the different measures and strategies put in place globally to ensure successful management of restorative dental patients during the COVID-19 era. Also, the knowledge, opinion and behaviour of restorative dental patients indicated for or undergoing care at this COVID-19 period were evaluated through a qualitative study design.

Pre-COVID-19 Era and Restorative Dentistry

Prior to the outbreak of COVID-19, restorative dental procedure has been majorly elective, in which case treatments were carried out on planned scheduled appointments but with occasional presentation of emergencies precipitated mostly by pain. During restorative dental procedures, the dental professionals are in close contact with the patients which expose them to contaminated saliva, blood and fluids which are possible carriers of infectious and highly contagious diseases like hepatitis in some otherwise healthy asymptomatic individuals, HIV in known AIDS patients, Ebola virus, Lassa fever virus among others[11].

Furthermore, restorative procedures were carried out routinely with the adoption of the principles of

universal precaution of infection control, adequate isolation and moisture control using rubber dam, with adequate suction, the use of absorbents together with standard and effective sterilization of instruments as well as disinfection of working surfaces. Though important, regular fumigation was not a routine practice except in some confirmed cases of highly infectious diseases.

However, the pandemic nature of COVID-19 infection is a game changer which has initially limited the practice of restorative dental treatment to palliative modalities of relieving the acute pain presentation with medication. Thus, in view of the transmission through the aerosol generated from restorative procedures and close contact with the patients[2], it therefore, behooves on the dental staff to know how to act during restorative dental procedures.

Additionally, the understanding of the epidemiology of the virus has opened up a number of the procedures that could be carried out with the use of PPEs, regular disinfection and fumigation in addition to the already existing standard protocols of infection control being put in place[12-14].

COVID-19 Era and Restorative Dentistry

In restorative management of patients during COVID -19 pandemic, the aim of the restorative dentist should be to prevent spread of infection among dental care practitioners and the patients. Treatment should be grouped into emergencies and electives, with priorities given to emergency cases during this pandemic, and strong emphasis and consideration being continually laid on preventive measures when taking up any restorative dental care. The preventive measures can be discussed under 3 phases; pre-treatment, treatment and post-treatment.

Restorative emergencies include severe tooth ache, abscesses, post endodontic treatment pain, complicated tooth fracture, aesthetic emergencies such as dislodged anterior tooth replacement or fractured/displaced denture. Also, extensive caries or defective restorations that cause pain can present as emergencies in restorative clinics. When these occur, they should be managed immediately with full personal protective equipment (PPEs) or medication. Elective cases which can be delayed for a reasonable time include conditions such as enamel caries, uncomplicated enamel fracture, tooth bleaching, posterior teeth replacement with dentures either removable or fixed[15].

Preventive measures for Pre-treatment phase

Appropriate precursory measures should be applied at this phase to prevent spread of infection. Teledentistry should be encouraged to reduce visits to the clinic[15], while patients' appointments should be staggered to shorten their waiting time for treatment and prevent crowding in the clinic. Also, patients should be informed not to bring companions, except when necessary such as in people with special needs and elderly patients. Furthermore, the body temperature should be checked with infra-red thermometer before the patient enters the reception area of the clinic, while correct social distancing (at least 6 feet or 2 meters apart) should be ensured at the waiting room with correct wearing of face mask mandated for people. In addition, proper hand hygiene should be observed while direct contact with door handles, surfaces and other objects should be avoided[16]. Recently, it has been advocated that in addition to face mask, face shield should be used, to limit the reflex act of touching or rubbing the eyes.

Prior to the decision to schedule patient for treatment, detailed questions should be asked for their initial screening. These can be asked remotely or at the entrance of the clinic. Such questions should include recent travel history to areas with high incidence of COVID-19, presence of signs or symptoms suggestive of COVID-19 such as high fever, cough, general body aches or muscle pains and respiratory distress in the last 14 days. History of exposure to an infected or suspected COVID-19 case is also paramount. Moreover, history of participation in any gathering, meetings or close contact with many unacquainted people should be carefully taken or clarified[8]. With a positive response to any of the questions, elective dental care should be deferred for at least 2 weeks and patients referred to the COVID-19 designated hospitals or COVID-19 team[16]. Emergency cases should be managed with medications and appropriate restorative procedures performed with PPE kit. However, negative responses to all the questions mean the patient can be treated as scheduled.

Treatment phase

In the clinic, if possible, the entrance door should always be opened to avoid touch and any appliance or prosthesis must be soaked in diluted povidone iodine prior to any procedure. The dentist and the clinic staff should adhere to standard precautions, which include: hand hygiene, use of appropriate PPEs, respiratory etiquette, sharps' safety, use of sterile instruments and devices, cleaning and disinfection of the environmental surfaces.

Facemasks should be selected based on procedure being performed. Full PPEs should be worn during an aerosol generating procedure and members of the dental team should be limited to two (the operator and the assistant) within six feet of the treatment area. If N95 masks are not available, surgical masks must be worn in conjunction with goggles, gowns and gloves. However, if basic PPEs, including surgical facemasks are not available, do not proceed with any dental procedure, regardless of emergency/urgency of the situation.

The restorative dentist should reduce chairside time and minimize 'doctor to patient' contact. To reduce the clinical time, preferences should be given to 'Bulk-Fill' composite resins as it permits increments of up to 4mm in thickness[17]. Use of magnification will help to maintain a safer distance from the patient while working. Also, the use of 1% hydrogen peroxide or 0.2% povidone as a pre-procedural mouth rinse should be encouraged as SARS-COV-2 may be vulnerable to oxidation[12].

Additionally, the use of rubber dam could significantly reduce airborne particles in operational field[18]. When rubber dam is applied, extra high-volume suction for aerosol and splatter should be used during the procedures along with regular suction[19]. Also, it is advisable to reduce the air pressure on the 3-way syringe to a minimum, so as to prevent any aerosol production while drying a tooth during composite restoration.

Carious tissue can be removed with a sharp spoon excavator in order to minimize the generation of aerosol[8]. However, in situations where this is difficult or painful, a slow speed micro motor hand-piece and a carbide bur can be used without irrigation. If irrigation is necessary, syringe and needle should be used for irrigation in slow manner to reduce splash with high vacuum suction[16]. Alternatively, laser photo ablation and the use of chemicals such as caridex, carislov and papacarie can be used to remove carious lesion without generating aerosols. On the other hand, carious lesion can be arrested in young children and in the geriatric population, with the application of Silver Diamine Fluoride (SDF) after excavation of soft carious tissue followed by Glass Ionomer (GI) or Resin Modified Glass Ionomer (RMGI) restorative material over the SDF treated carious dentine[8].

Furthermore, extra-oral dental radiographs, such as panoramic radiographs or Cone Beam Computed Tomography (CBCT) may be used as appropriate alternatives to intraoral dental radiographs during the COVID-19 pandemic, as the latter can stimulate saliva secretion and coughing[20]. In situations where intraoral radiographs are mandatory such as intra-operative endodontic radiographs, digital radiography with close attention to adequate disinfection will be appropriate.

Moreover, during conservative and endodontics treatments, clinical micro motor and a contra angled hand- piece with latch type burs without water irrigation should be preferred. Alternatively, small quantity of water in a syringe can be used to cool down the tooth surface with intermittent cutting. When using high speed turbo-charging hand pieces that can generate aerosols and create an immersion environment, dental workers should use enhanced grade^{-3} protection. Anti-retraction dental hand-piece with anti-reflux design is strongly recommended as an extra preventive measure for cross-infection[21].

Digital impressions should be used in removable, fixed or implant prosthodontics in order to prevent spread of infection through cross contamination in making impressions and pouring casts. When facility for digital impression is unavailable, use of customized tray is the best alternative, however metal trays can be used with adequate sterilization protocol but plastic impression trays should be avoided. As much as possible, tray, material and intraoral soft tissues manipulation during impression making should be done to prevent gagging and retching. Also, impressions should be disinfected and packed in two layers of airtight bags prior to dispatch. Appropriate disinfection of removable and fixed prostheses for repair should also be ensured.

Implant surgeries should be postponed, if possible, till later dates. However, if highly indicated, osteotomies for implant site can be accomplished in selected bone situations at speeds as low as 50-100 rpm without the use of saline for irrigation. Slow intermittent drilling using sharp set of drill and following the sequence suggested by the implant manufacturer is very essential[16].

At this time, the use of air conditioners should be avoided but the dental surgery should have adequate cross ventilation with use of air extractors.

Post treatment phase

At the end of every restorative procedure, the whole treatment chamber should be fumigated and the operators should carefully remove the protective mask/goggles and clothing before leaving the clinic. The used instruments should be adequately sterilized after a thorough wash and all surfaces as well as the floor disinfected with a disinfectant containing 2,000 mg/l chlorine[22]. In addition, non-disposable equipment (hand-pieces, dental x-ray equipment,

dental chair and light) and surfaces such as door handles, chairs and desks should be cleaned and disinfected with 1% sodium hypochlorite. The dentist and the clinic staff should change from scrubs to personal clothing before returning home.

Furthermore, the medical waste generated by the treatment of patients with suspected or confirmed COVID-19 infection are regarded as infectious medical waste. Thus double-layer yellow colour medical waste package bags and "gooseneck" ligation should be used and the waste disposed according to the Bio Medical Waste Management Rules[16].

The Future of Restorative Dentistry

There is no doubt that the period of COVID-19 caught up with many countries in the world including Nigeria unaware, just like other infectious diseases such as Ebola and Lassa fever. However, adequate plans must be made to make sure that all the necessary measures are put in place to combat any future challenges promptly.

As declared by WHO, COVID-19 pandemic may be with us for a long time and not likely to be eradicated or wiped out so soon[23], therefore, lifestyle modification to adjust to its continuous existence should be in place globally, just like for HIV infection, but stigmatization of those affected should be avoided.

Consequently, the practice of restorative dentistry and dentistry as a whole cannot and should not be business as usual any more. Restorative Dentistry as one of the high-risk dental specialties which involves many aerosol generating procedures (AGPs), should mandatorily make use of universal precautions as the standard practice.

Though, it is common in developing countries like Nigeria to relax all the protocols and guidelines formulated after an outbreak of a disease, the COVID-19 pandemic should be a game changer to the restorative practice. All the dental personnel and stakeholders involved should, therefore, ensure regular evaluation of compliance with all the guidelines and protocols of services. In addition, if indicated, the review of such guidelines should be done. Furthermore, there must be constant awareness of infectious threats that may challenge the present infection control protocols on ground and thus safeguard towards such[24]. All these should take into consideration the tripod activities of the teaching hospitals that is: the patient care, training and research. The primary and secondary levels of care should not be left out as far as emergence and re-emergence of infection is concerned.

The Clinic

While maintaining the triage of patients prior to treatment as recommended[23], the protection of dental personnel, students and patients against infectious diseases should be paramount all the time, while facilities should be upgraded to international level so as to accommodate the set guidelines.

Students' training

In restorative dentistry clinics and dentistry as a whole, use of simulators and monitors for training should be intensified at both preclinical and clinical levels. This is expected to limit exposure to patients. Also, the use of workstation monitors for practical demonstration should be adopted as the standard of training as it is done in developed countries. Problem-based study and online training should be encouraged and devices to record and listen to lectures should be available for students' use[24].

Place of Teledentistry in Restorative Dentistry

Information and Communication Technology (ICT) has been a useful tool in diagnosis and management in medicine as well as in dentistry. However, in management of cases, it has more place in preventive dentistry than curative such as restorative dentistry.

With teledentistry, dental education and awareness can be intensified especially in remote areas where dental clinics may not be easily accessible. Also, it may be used to target reduction in cases that will be presenting in the dental clinics. However, the challenge of availability of internet and electricity is enormous in developing economy like ours and may hamper the use of teledentistry.

The COVID-19 pandemic has actually made the use of online training meetings and lectures the order of the day globally, for both undergraduate and postgraduate education. This should be intensified to reduce the exposure to patients.

Research

Research in Restorative Dentistry should focus more on how to decontaminate and reduce aerosol generation in restorative procedures.

Research report

In view of the several guidelines and protocols formulated to ensure the successful delivery of restorative care and prevention of spread of COVID-19 during care, it became necessary to interview

some patients that presented for restorative care, in order to assess their knowledge and view about the subject matter.

In addition, the majority of research on COVID-19 infection and associated anxiety in Nigeria have focused on the professionals. It was also hypothesized that the pandemic would have psychological effect on patients.

Methodology

A qualitative research design was used in order to obtain the patients' views, as much as possible as they freely expressed themselves.

Patients selection

Patients that presented at the restorative dentistry clinic of dental centre, University College Hospital, Ibadan were approached and 15 patients were randomly selected from those that consented to participate in the study from the Conservative and Prosthetic clinics. Participants were interviewed individually after the verbal consent was obtained which included voice recording.

Data Analysis

The audiotaped interview recordings were transcribed verbatim. Thematic analysis of the data generated was done. This method of analysis is used to identify, analyze and report patterns within a qualitatively generated data[25]. It is a common method of qualitative analysis which is useful in research to find people's view, opinion and or knowledge about a particular concept.

An interview guide was developed for direction during the interview. Four themes were identified within the study. These were the knowledge about COVID-19, view about the infection and infection control, the effect of the lockdown on treatment as well as the fear/anxiety about the disease.

Results

The participants; 8 females and 7 males, were between the ages of 19 and 72 years with mean age of 39.6 ±17.53 years. Some of the selected responses in relation to the themes identified are shown in Table 1.

Table 1: Main categories / subcategories of thematic analysis and selected responses from the 15 participants

Theme	Subcategories	Selected Responses
Knowledge about dental care and relationship with spread of COVID-19 infection		M4: "Well they said, person to person, hugging, kissing that is all I know" F1: "They are not related" F2: "I was not aware of the relationship of COVID-19 to dental care until I came to the clinic and now I think it is really related and in my opinion, it has higher risk than other clinics" F3: "If it is COVID-19, I have quite a number of information, but relating to dental care, I don't" F5:" I don't know if there is relationship between COVID-19 and dental care" F7: "I don't have information about COVID-19 and dental care" M3: I think they can be related, through the equipment used in the hospital" M4: "Well I don't know so much about COVID-19 and dental care but I know, they say cover your nostrils and mouth so anything that has to do with oral, definitely one is more prone" F4: "I believe the dental clinic is one of the easiest places for the virus to spread because it deals with the face"

Personal View about the infection	Believe about existence of the infection	F2: "Yes I know it is real because my uncle and my roommate had it but they have both recovered." While another confirmed the fact that COVID-19 infection is not limited to Nigeria. M1: "Yes it is real, because I have cousins who have been affected so I know it is real. Especially in US" However, one of the participants had a contrary view about the infection F7: "I don't think it is real, if there is really COVID-19 infection, why don't they showcase the people infected maybe through social media, and I don't know anyone with the virus"
	Pandemic non-existent but more political than reality	
	Infection control	M4: "I don't think the clinic is following the social distancing because no spacing with the sitting arrangement" F4: "Well not strictly, the waiting room does not follow social distancing strictly" F2: "Yes they took my temperature when I first came but I when I came back later in the day, the person was not there" M2: "You are not following social distancing in the clinic, the rule says 2meters apart"
	View about appointment and infection control	M2: "I think you have to reduce drastically, the number of patients you attend to or you increase your number of hours and the sitting arrangement. Some can come between 8am - 12noon and another group 12-4pm for treatment, that will reduce our interaction in the hospital" F8: "We stay too long in the hospital waiting for treatment."
Effect of the Lockdown on treatment		F4: "Yes I stayed away from dental clinic, it has affected me by delaying my treatment but I had no symptoms during the lockdown." F5: "I had pain in a tooth during the lockdown but I had to take analgesic" M5: "It affected me, I was told not to come during the pandemic and they rescheduled my appointment for my feeding plate" M4: "Yes I had appointment during the lockdown and I was told the dental clinic was closed and it shows that one needs to be careful" F7: "My first visit to dental clinic was during the lockdown and I was in serious pain, but the clinic was closed, so I was affected. If not for the pandemic I would have been treated" F3: "Yes I had appointment during the lockdown and was told to come back for my treatment" M7 "I had a fractured anterior composite which affected me psychologically, I had to devise a means of smiling without showing my teeth or explaining to people what happened"

Fear of contracting the infection in dental clinic	Fear of contracting infection in the clinic	F4: "I had to stay away from dental clinic because I was scared" F2: "Yes I was scared from going to hospital including dental clinic. My fear was 9 on scale of 1-10 but now it is 7"
	Trust	M6: "No, no fear at all. I know that if there is any reason for the health care givers to be careful with us they will be. If they know I will be in danger they will not put me in danger. If there is need to send me back. I know they will be careful with us and protect us from being infected"
	Psychological effect of PPE on patients	M5: "It does not affect me. I know everyone is just protecting themselves" F5: "They are protecting me and protecting themselves" F4: "Yes there is a change in the dress code, it's to protect themselves and protecting us indirectly" M3: "No, I am not affected by the way they dress all covering up at least 90% of their body" F3: "To keep the doctors safe, because some things will splash, and the doctors will still treat other patients" M2: "I think it is nice."

Main theme 1: Patients' Knowledge about COVID-19

All the participants were knowledgeable about the route of spread of COVID-19 infection and were able to mention the common routes of infection such as handshaking, sneezing, coughing and touching infected surface(s). However, only one person (M4) added some other possible routes such as kissing and hugging.

Main theme 2: Patients' Personal view

The majority (14 out of 15) of the participants believed that COVID-19 infection is real. Their sources of information were from friends and relatives but further corroborated by social media and prints. Also, some (7 participants) confirmed knowing people like close relatives who have contracted the disease apart from the cases announced in the news. However, one of the participants had a contrary view about the existence of the pandemic. This person believed that the noise about the pandemic is more political than real.

Concerning the personal view about infection control, all the people interviewed were aware of the measures in place for containing the infection such as avoiding crowded area, social distancing, use of protective garments, covering of nose and mouth with face masks as well as adequate and regular hand washing.

All the participants were of the opinion that most of the preventive measures were in place in the clinic except social distancing in the waiting room, which 6 people particularly laid great emphasis on. Furthermore, 2 people complained bitterly about absence of health personnel to measure the body temperature prior to entering the hospital. Patients believe time being spent in hospital is too long and called for a review.

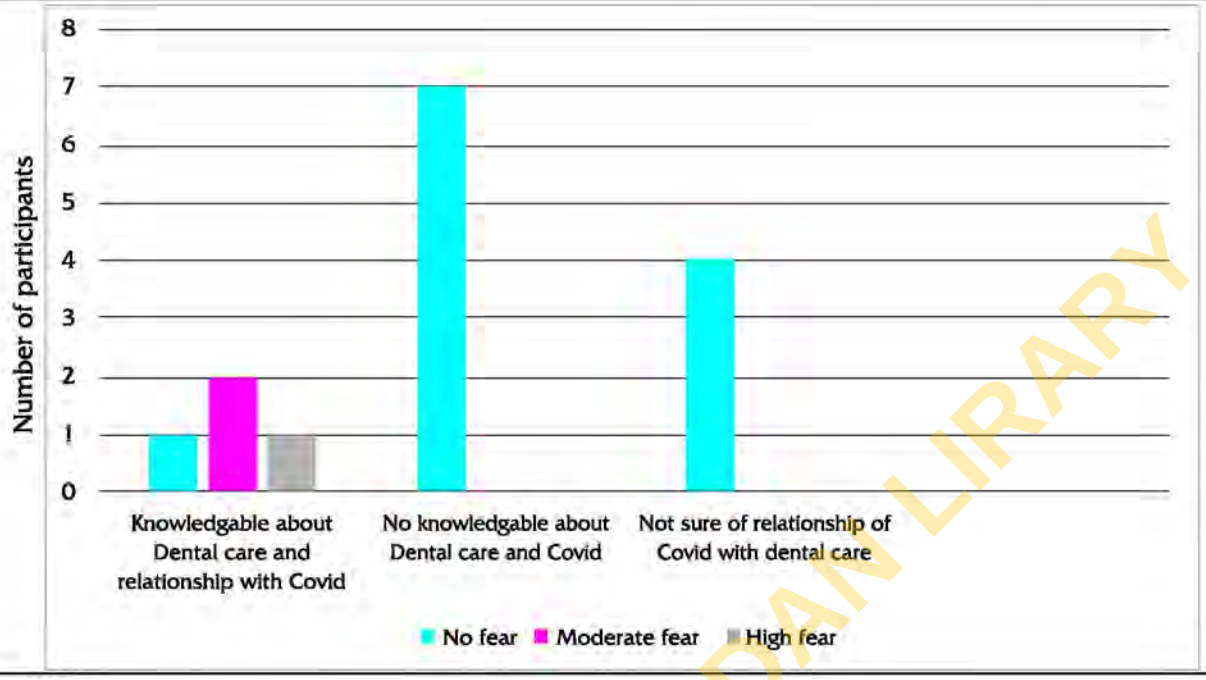
Main theme 3: Effect of the lockdown on treatment/care

During the nationwide interstate movement restriction and lockdown involving some states, it was obvious that accessibility to restorative dental care was affected as pointed out by seven of the participants. Three participants had acute pain that was privately managed by self-medication, while four others claimed they had their appointments changed several times following clinic visits.

Main theme 4: Fear/anxiety of contracting the infection in the dental clinic

The fear of contracting the infection in the dental clinic was shown by 3 of the respondents while the rest were not perturbed but confident that the right decision and appropriate precautions would be taken by the dental care professionals. Since health care workers will not want to put themselves as well as the patients in danger, it is expected of them to be highly professional.

Most of the participants that had no knowledge about the relationship between dental care and COVID-19, were the ones who showed little or no fear of contracting the infection in the clinic and this was significantly correlated. (p=0.04). **(Fig. 1)**.



P=0.04

Fig 1:Knowledge about the relationship between dental care and COVID-19

The psychological effect of use of PPEs by the dental personnel was also assessed. It was noted that all that observed a change in mode of dressing, welcomed the use of the PPE and were not in any way disturbed or affected. Two participants felt the PPE might just be protecting the healthcare givers only, but 4 participants felt the use of PPEs invariably protect the patients too, while others were indifferent.

Discussion

A qualitative design approach was used for this study to allow the patients to express themselves freely, on the subject matter. This type of approach can provide an understanding of the perspective of the people[26]. It allows the respondents to expatiate on their responses and also gives details, that quantitative may not give[27], with a better target intervention to the particular context[26]. The majority of the participants believed in the existence of COVID-19. Some of these people apart from getting information from different media, also had close relatives or acquaintances who had contracted the disease. However, the person that had a contrary view about the existence, was because she had no close contact experience. Does this then mean one needs to know who is infected before accepting the reality? This shows the attitude and belief of some people towards the infection. While some believe it is man-made, some think it affects the rich and famous alone since it originated from foreign land; China and also associated with travel to an endemic area. A general observation from the public also suggests that some Nigerians think it was politically motivated. This study confirms beliefs of some of the community dwellers in relation to COVID-19. It is therefore, necessary to intensify on educating in view of prevention.

Also, the majority were knowledgeable about the infection and the routes of spread. There has been many documentations and information on routes of spread of the infection[2,28]. However, the relationship between dental care/procedures as a means of spreading the infection through aerosol generating procedures was not clear or known to the majority of the participants. Though some knew face masks are used to cover the nose and mouth, they see no connection between dental treatment and spread of COVID-19 infection. Need for education on dental care and how it is affected by COVID-19 is pertinent. This will go a long way in people adopting preventive measures and avoiding unnecessary dental visits.

Furthermore, most of the participants had their treatment rescheduled during the lockdown. This was the case in many other countries too with all dental clinics shutting down in view of the peculiarity of dental treatment and the spread of the infection[29,30]. During this period, only emergency cases were being attended to in many countries and this led to increase in emergency treatment as observed by Gou et al[31]. Attending to only emergency cases, was necessary to reduce patients' influx to the hospital and thereby limiting the spread of the infection[32]. However, respondents in this study

claimed they had to be paying regular visits to the dental clinic to inquire when the hospital was going to be reopened. These visits could have been avoided through the use of teledentistry.

Indeed, the use of teledentistry has scaled up greatly due to the pandemic, because it allows for little contact with the patients. Patient management is achieved through teleconsultation, tele-diagnosis, tele-triage and monitoring of patients[33]. This will reduce the stress of patients presenting in the clinic without being attended to. Amongst the participants that were affected by the lockdown, some had pain and treated themselves with self-medication, while others had their appointments rescheduled severally. Also, with teledentistry, information can be disseminated to patients about the developments in the clinic, while still giving adequate care.

Without doubt, COVID-19 infection and the lockdown came with its psychological effect on people[34,35]. One of the participants who had a fractured anterior restoration during the lockdown, claimed he was psychologically affected by the distorted aesthetics and had to devise a means of smiling or had to avoid people. In addition, a few others had fear of contracting the infection in the dental clinic. The knowledge of relationship of dental care/procedures especially the aerosol generating procedures (AGPs), added to fear of coming for dental treatment and this was mostly expressed by the female participants.

However, the majority of the participants that showed little or no fear about contracting the disease were those that had no knowledge about the relationship between dental procedures and COVID-19. This set of people were also those who showed confidence in attending dental clinic with view that the doctors cannot expose them to a known danger. This confidence displayed by participants was in view of their belief in the dental clinic where the study was conducted, which is one of the foremost dental centres in the country that is averagely equipped and prioritizes infection control.

Furthermore, one would think the use of PPEs in restorative clinic will create some degree of fear in the patients, however, the reverse was the case. The majority of the participants claimed they were not affected by the dressing and believed the health care personnel needed the new mode of dressing (PPEs) to protect themselves and invariably protecting the patients too. Personal Protective equipment is the standard of dressing recommended for any aerosol generating procedures[36]. It is possible that these patients would have been adequately informed from the media on the need for the new normal change in mode of dressing by health personnel in order to prevent cross infection.

The study showed that most restorative patients were not aware of the relationship between COVID-19 and dental care, though the period has affected patients' treatment and treatment seeking behaviour negatively. However, the use of PPEs is a welcome change with many patients having confidence in the dentists in protecting them from infection. It is thus pertinent that dentists and supporting staff make sure all the necessary guidelines for infection control is not compromised in order not to let down the trust placed in them.

Future Recommendations

Principle of universal precautions should be taken as mandatory in all restorative procedures with strict adherence to protocols and guidelines.

Regular training and enforcement of preventive measures in the dental clinics amongst personnel and patients should be encouraged.

The dental clinic settings should change from open clinic demarcated into cubicles to separate individual clinics or surgeries. This will curtail generated aerosols to the particular room and prevent spread.

Placement of air extractors in the clinics is recommended for aeration of clinics and reduction of aerosols.

Patient appointments should be staggered while reducing the number of patients per day.

Though the majority of the restorative procedures generate aerosols, the more aerosol-generating procedures such as tooth preparations for crowns, root canal treatments should be scheduled last in the clinics.

Arrangements should be made to provide more facilities in terms of clinic spaces and personnel to be able to accommodate more patients per day.

Single-visit treatments where possible, such as root canal treatment, denture repair, fixed prostheses fabricated with CAD-CAM Technology (Computer Aided Design-Computer Aided Manufacturing) should be encouraged to reduce patients' exposure and number of visits to the clinic.

The use of rubber dam as the ideal and standard form of isolation should be mandatory for all restorative procedures where indicated. This prevents exhalation from the patient from reaching the operator and limits exposure to only the field of

operation.

Good details of patients' contacts should be strictly taken for contact tracing in case of a suspected case.

Conclusion

In combating the spread of COVID-19 infection during restorative procedures, the current infection prevention and control strategies during and after the epidemic should be improved. Guidelines on infection control should be maintained and there should be prompt response to similar contagious diseases in the future. Furthermore, researches should involve discussion on the knowledge and attitude of patients as well as understanding the epidemiology of the present infection while guiding against and preparing for any future occurrences that may affect the practice of restorative dentistry.

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