

Coronavirus Infection: How Prepared is Dental Practice in Nigeria?

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Abstract

Objective: Coronavirus disease 2019 (Covid-19) is a respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. It was first described in late 2019 in Wuhan, China and is mainly transmitted through droplets generated from mouth (through coughing and talking) and nose (through sneezing). The objective of the publication was to assess the preparedness of the Nigerian Dental Practice for COVID-19.

Materials and Methods: A broad electronic search was executed in Pub Med and Google Scholar using relevant search terms. Supplementary publications were found from the review of references.

Result: Infection control protocols must be rigidly adhered to. Teledentistry may be the new direction of the future dental practice and the extensive use of robotics in the dental clinics. Patients' visits should also be on scattered appointment basis to prevent unnecessary crowding. Personal Protective Equipment (PPE) is the gold standard for protection. Its use requires adequate and practical training which is grossly lacking in dentistry in Nigeria. Training is so important in donning it on and doffing it off especially the doffing it which is major point of contracting infectious diseases among health care workers. There is a serious need for local production of PPE to reduce cost on their patients.

Conclusion: COVID-19 has dramatically changed the world in fundamental ways. As the world enters this phase of a "new normal", the dental profession in Nigeria must be at the forefront of innovation in locally appropriate, sustainable and effective infection control strategies.

Keywords: COVID-19, Dental Practice, Nigeria, Infection Control

Introduction

Coronavirus disease 2019 (Covid-19) is a respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus¹. The SARS-CoV-2 virus is a single stranded RNA virus that belongs to the coronavirus family. This family of viruses was named corona (crown) because they have spiked glycoprotein molecules on their envelopes that give the characteristic shape of a crown when viewed under the microscope. The coronavirus family has been further classified into alpha, beta, delta and gamma coronaviruses.

SARS-CoV-2 is an orthocoronavirus belonging to the beta coronavirus genus. It is postulated that the initial transmission was from bats to humans¹. The two other well-known beta coronaviruses are severe

acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) which have been responsible for previous epidemics of severe acute respiratory illnesses in 2002 - 2003 and 2012 respectively¹.

The disease was first described in late 2019 in Wuhan, China and has since taken the world by storm¹. The first cases of pneumonia of unexplained etiology were reported by doctors in Wuhan, China early December, 2019. These cases were characterized by acute respiratory distress symptoms and were officially reported to the WHO country office in China on December 31 2019¹. By, 11th March 2020, a global pandemic was declared by the World Health Organization when the virus had infected greater than 100,000 people in over 110 countries³.



The terms “epidemic” and “pandemic” have often been used interchangeably leading to a lot of confusion⁴. This ambiguity was very evident when the World Health Organization characterized the H1N1 influenza outbreak as a pandemic⁵. Nevertheless, epidemics and pandemics are as old as mankind. The first documented one was the Athenian plague of 430-426 B.C. Others that have followed were the Atonine plague (165 – 180AD); the Justinian plague (mid 6th century); the Black death (1300s) and the Cholera pandemic (1831 -1832). The Spanish flu (1918 – 1920) was the first global pandemic in modern times followed by the HIV and the Swine flu pandemics⁶.

As at 26th June 2020, there are 9,710,205 confirmed Covid-19 cases with 491,783 deaths in 213 countries⁷. The symptoms most commonly associated with COVID-19 include fever, cough, dyspnea, fatigue, headache, sore throat, haemotypsis and rhinorrhea^{8,9}. The period of onset of symptoms ranges from 6 to 41 days with a median period of 14 days⁹. Anosmia and ageusia have also been described as the initial and/or only symptoms in about 15% of cases¹⁰. The presence and severity of symptoms vary widely among individuals depending on age and co-morbid factors. Elderly and immune-compromised individuals are more likely to experience severe signs and symptoms.

Transmission

Coronavirus is a respiratory infection mainly transmitted through droplets generated from mouth (through coughing and talking) and nose (through sneezing). These droplets are of different sizes: particles that are >5-10µm in diameter are referred to as respiratory droplets, and when they are <5µm in diameter, they are referred to as droplet nuclei¹¹. Updated evidence suggests that Covid-19 virus is mainly transmitted between individuals through respiratory droplets and contact routes¹²⁻¹⁴. Droplets are generated from symptomatic individuals through coughing, sneezing, talking and singing within 1 metre distance to uninfected person whose mouth, nose and conjunctiva are exposed. Transmission occurs when a person is in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person¹⁵. Therefore, transmission of the COVID-19 virus can occur either directly or indirectly via surfaces in the immediate

environment or objects touched by infected persons such as medical instruments (stethoscope or thermometer), door handles, etc.

Airborne transmission has also been said to be a possibility especially with small size droplets (<5µm) called droplet nuclei. These droplets are incorporated with microbes and can remain in the air for a long period of time and can infect persons at a distance of more than 1 metre away. Aerosol generation peculiar to dental practice which can leave droplet nuclei in the dental working environment called for caution. This is contrary to the findings of a study in China among 75,000 COVID-19 patients¹⁶.

Transplacental transmission is yet to be established by evidence from medical literature but the American Center for Disease Control and Prevention (CDC) advised temporary separation between mother and child after delivery¹⁷.

Transmission is accomplished when uninfected persons get the virus on their hands and then touch their face, mouth, nose and eyes. This makes the virus to come into direct contact with potential host tissues.

In dentistry, the major work is in the mouth and many of the procedures done are aerosol generating through the use of high-speed rotatory handpieces and ultrasonic scalers. There are also instances where patients' coughs or sneezes in the dental clinics predispose the dental team (dentist, nurses and other auxiliaries) to COVID-19 and other infections. Of importance is the fact that dentists are known to adhere strictly to the use of face shields, masks and high suction pumps in standard practice. However, despite all these barriers, close body contact is inevitable between dentists and their patients. Therefore, there is a need for rigid observance of strict infection practices to avoid patient to patient, patient to dental team and dental team to patient transmission.

In Nigeria, many people believe that COVID-19 pandemic is a scam and many citizens see it as a means of embezzlement by the people in political power¹⁸. Likewise, many religious leaders believe the pandemic is a hoax. “**Mallam ya ce babu corona**” was very popular during the early onset of the infection while there were many religious organizations including churches operating at full capacity until law enforcement agents actively demanded their compliance with social distancing protocols.

Signs and symptoms of COVID-19

Most people infected will recover spontaneously while about 2% will have serious health challenges. Underlining medical conditions such as cardiovascular diseases, hypertension, diabetes mellitus, cancer of any origin and renal diseases are potentials for fatality.

The incubation period for coronavirus infection is about 14 days but symptoms may emanate from 2 days up till the 14th day¹⁹. The symptoms are diverse in nature. The first class includes fever, dry cough and tiredness. Less common symptoms are aches and pains, sore throat, diarrhea, conjunctivitis, headache, loss of taste or smell, a rash on skin, or discolouration of fingers or toes. The third class symptoms are difficulty in breathing or shortness of breath, chest pain or pressure and loss of speech or movement. Patients with COVID-19 may present in the dental clinics with any of these symptoms and this should serve as high index of suspicion. The symptoms are basically the same with adults and children but usually milder among children¹⁹.

Risk factors

The risk factors for COVID-19 are recent travel history abroad or within the country to locations with incidence of the infection and being in close contact with an infected person for more than 5 minutes or when an uninfected person is coughed or sneezed upon¹⁹. However, there are evidences of community transmission which is the current phase in Nigeria.

Prevention and challenges

The primordial level of prevention is such that the infection has not occurred in a particular community. In such situations, the people are prepared ahead of the first index case using health education of the populace to impact skill of prevention. The needful is done at this time such as preparation for a place of quarantine of exposed individuals, handwashing with liquid soap, use of hand sanitizer and general grooming activities. Primary level of prevention will entail eliminating the risk factors such as social / physical distancing and discouragement of travelling abroad. Secondary level of prevention involves mass screening (COVID-19 testing) to determine carriers of the disease. The tertiary level of prevention means the hospital care of symptomatic patients in special care centres or isolation centres. This may involve the use of ventilators and specialised health care system. The quaternary level of prevention is all about discouraging over medicalisation. Many people are vending for medicine that could cure COVID-19

which are actually not proven and may lead to physical, health and economic injury to the patients.

WHO and CDC¹⁷ have laid down guidelines to follow in order to avoid contracting the Covid-19. The followings are the summary of the guidelines:

- Avoid large events and mass gatherings.
- Avoid close contact (within about 6 feet, or 2 meters) with anyone who is sick or has symptoms.
- Stay at home as much as possible and keep distance between yourself and others (within about 6 feet, or 2 meters), especially if you have a higher risk of serious illness. Keep in mind some people may have COVID-19 and spread it to others, even if they do not have symptoms or do not know they have COVID-19.
- Wash your hands often with soap and water for at least 20 seconds, or use an alcohol-based hand sanitizer that contains at least 60% alcohol.
- Cover your face with a cloth face mask in public spaces, such as the grocery store, where it is difficult to avoid close contact with others, especially if you are in an area with ongoing community spread. Surgical masks and N95 respirators should be reserved for health care providers.
- Cover your mouth and nose with your elbow or a tissue when you cough or sneeze. Dispose of the used tissue properly. Wash your hands right away.
- Avoid touching your eyes, nose and mouth.
- Avoid sharing dishes, glasses, towels, bedding and other household items if you are sick.
- Clean and disinfect high-touch surfaces, such as doorknobs, light switches, electronics and counters, daily.
- Stay home from work, school and public areas if you are sick, unless you are going to get medical care. Avoid public transportation, taxis and ride-sharing if you are sick¹⁰.

Infection control protocols are not strange in dentistry and the use of surgical facemasks, eye wear and a clinical coat/scrubs are very common in dental practice. The advent of hepatitis and HIV/AIDS led to a great change of attitude to infection control in dentistry but COVID-19 is no match to these infections in terms of level of infectivity and contagiousness. Personal Protective Equipment (PPE) is the gold standard to a level⁴ infection. Its use requires adequate and practical training which is

grossly lacking in dentistry in Nigeria. Training is so important in donning it on and doffing it off especially the doffing it which is major point of contracting infectious diseases among health care workers. PPE in Nigeria are most imported from abroad with its associated high cost. The appropriate technology to adapt will be to manufacture them locally. Dental treatment costs are already high to the medium and low income workers in Nigeria, therefore the cost of expensive PPE to treat such patients should not be contemplated. No doubt the cost of PPE will in no small means affect the number and type of treatments most dentists will offer during and after COVID-19 Pandemic.

The use of PPE is not without its demerits such as increased sweating especially in clinics that are not fully air conditioned. Additionally, the fact that dentist will not remove the PPE until the procedure is done or at close of the day makes it worse. The use of toilets intra-procedure is not practicable unless there is agreement on additional cost for the patient to buy one more PPE.

Most dental practices in Nigeria lack adequate and standard waste disposing methods and hence waste generated (including PPE) during management of patients during COVID-19 becomes a great deal^{20,21}. Provision of adequate waste disposal methods must be put in place to avoid invasion of scavengers on our open land fill waste sites^{20,21}.

The use of robots to take vital signs and other medical/dental procedures to minimize person to person contacts is very important in the management of patients during COVID-19 pandemic.

Sterilisation

The standard dental practice is to avoid transmission of infection in the dental practice. Dental instruments should continue to be sterilized in the standard way. The peri-dental operatories such as surfaces, mixing slabs and trays must be disinfected after every patient use. This will cause additional labour for the para-dental staff and increased running costs. The use of ultra-violet (UV) light to sterilize the clinics is advocated especially with the presence of droplets loaded with microbes released into the dental operatories. The UV light machine is expensive and many dental clinics cannot afford this. Chemical fumigation of the clinic is a cheap alternative but this cannot be done after every patient or on daily basis for logistics reasons.

Triage

Infrared thermometers should be used to screen patients and staff for fever before entry into the clinic. A travel history should also be taken but this is becoming irrelevant because of the evidence of community transmission of COVID-19. Patients should also be asked (verbally or by means of questionnaires) whether they have experienced the symptoms of COVID-19 in the past 2 weeks. Physical distancing should be maintained in the reception area and in the clinic areas.

Aerosol- larger particle $>10\mu\text{m}$ settle quickly on surface of materials close to them, but droplet nuclei remain in the air for a longer time. Wind direction also affects the time of being airborne as regards the droplet nuclei.

Level of infection

The level of infection risk from COVID-19 has been described as negligible risk, low risk and moderate/high risk²².

A person at negligible risk is someone who had short (15min) contact with a confirmed case in public settings such as in public transportation, restaurants and shops. A healthcare personnel who treated a confirmed case while wearing appropriate PPE without any breach identified is at negligible risk. In such cases, no follow-up is required²².

For low risk, a person who had a close (within 1m) but short (15min) contact with a confirmed case, or a distant ($>1\text{m}$) but prolonged contact in public settings, or any contact in private settings that does not match with the moderate/high risk of exposure criteria. In such cases, they are asked to measure their body temperature twice a day and check for clinical symptoms. In cases of occurrence of symptoms like fever, cough or dyspnoea, they are asked to wear a surgical mask, isolate themselves and immediately contact the emergency hotline indicating that they are contacts of a confirmed COVID-19 case²².

For moderate/high risk, persons who had prolonged ($>15\text{min}$) direct face-to-face contact within 1m with a confirmed case, shared the same hospital room, lived in the same household or shared any leisure or professional activity in close proximity with a confirmed case, or travelled together with a COVID-19 case in any kind of conveyance, without appropriate individual protection equipment. Healthcare personnel who treated a confirmed case without wearing appropriate PPE or with an identified breach²².

Viability of virus on fabrics, metals and air

Coronaviruses can persist on surfaces like metal, glass or plastic for up to 9 days²³. The most contaminated objects are self-service printers, hand sanitizers, gloves and doorknobs²³. It has been shown that respiratory droplet spread and faecal shedding are the major causes of environmental contamination. However, the virus can be inactivated within 1 minute using 62-71% ethanol, 0.5% hydrogen peroxide or 0.1% sodium hypochlorite; while 0.05-0.2% benzalkonium chloride or 0.02% chlorhexidine digluconate are less effective. The most effective means of environmental decontamination are 24hour ultraviolet germicidal air filtering and use of chlorine-based disinfectant for both air and surface disinfection²³.

The workers disinfecting the hospital environment need to be adequately protected with minimum respiratory protection equivalent to N95 or equal level, disposable gloves, disposable arm-length gown, whole body protective clothing including slippers and eyeglasses, or a face shield²³.

Role of tooth brushing

Tooth paste contains same detergent e.g. sodium lauryl sulphate like those found in hand wash gels are recommended against coronavirus, it dissolves the lipid layer surrounding the virus. Therefore, tooth brushing with toothpaste can be used as a means of reducing viral load before going out and putting on of PPE before dental procedures. This can also be achieved by just gagging with 1/10 dilution of hydrogen peroxide. It is feasible that hydrogen peroxide that has been in use in dental practice with proven safety and efficacy could be employed in limiting the infectivity and spread of SARS-CoV-2 whilst awaiting the emergence of fail-proof prophylactic and therapeutic measures²⁴.

Design of dental clinics

Dental clinics should have clearly designated triage areas at the entrances. Waiting rooms should have clearly demarcated seats with at least 2 metre space between people. There should be adequate ventilation. The use of high speed vacuum / saliva ejectors is mandatory for aerosol generating procedures. In view of the fact that coronavirus can remain in the air for a long time, this calls for the use of air extractor in the clinical areas of the dental operatories. There is a serious agitation to have a changing room with bath and shower within the dental outfits to enable all clinical staff to take a shower after day's work. The dental operator gowns

(scrubs, ward coats etc) should be washed in a designated room within the dental clinics. This will prevent clinical staff wearing the clinical clothing to their home to prevent transmission of infectious agent to their family members.

Future dental practice

Teledentistry is the new direction of the future dental practice and the extensive use of robotics in the dental clinics. Patients' visits should also be on scattered appointment basis to prevent unnecessary crowding. Cost of treatment will most likely be raised as a result of decontamination and infection control processes. Raised cost of treatment will in no doubt further worsen the poor dental service utilisation in Nigeria²⁵. Aerosol generating procedures need to be reconsidered likewise the use of high-speed rotatory instruments. The current infection protocol in most dental practices need to be revised and put to strict use in view of the new infectious agents being encountered. The hospital management and the government agencies need to improve current funding status of dental hospital settings. For the private setting, there is serious need to look into local production of PPE to reduce cost on their patients.

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