

Public Health Challenges of Restorative Dental Practice in Low Resource Settings during the Covid-19 Pandemic

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ABSTRACT

Background: COVID-19 remains a major public health threat globally, and has challenged healthcare systems and services including oral health

Objective: This study examines the key public health challenges posed by the COVID-19 pandemic in low resource settings. While healthcare services are learning to cope with the COVID-19 pandemic, dental care services, in particular restorative dental practice have been adversely impacted because of the closeness of caregivers to the patient's mouth as well as the generation of aerosols during most restorative procedures. This presents a challenge for low-and-middle-income countries (LMICs) such as Nigeria where weak and poor governance structures characterize healthcare systems in addition to paucity of economic resources. Another challenge in the form of COVID-19 conspiracy theories has threatened to undermine public health efforts designed to control the pandemic.

Conclusion: The implementation of optimal guidelines and safety protocols for effective COVID -19 infection prevention and control is a major challenge for restorative dental care practice in low resource settings owing to paucity of key material resources and inappropriate behaviour associated with lingering doubts about COVID-19 reality among the majority of the populace. The Safer Aerosol-Free Emergent Dentistry concept offers a viable practical approach for restorative dental practice in LMICs during and in the post COVID-19 pandemic era. There is a need to deploy all resources, human and material, in the education and enlightenment of the populace regarding the reality of COVID-19.

Keywords: Public health, restorative dental practice, low resource settings, COVID-19 pandemic

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INTRODUCTION

COVID-19 is a disease caused by the SARS-CoV-2 coronavirus, which is a new coronavirus. The World Health Organization (WHO) initially became aware of the novel virus on December 31, 2019, after a series of 'viral pneumonia' cases were reported to have occurred in Wuhan, Hubei Province, People's Republic of China.¹ The WHO on January 30, 2020 then declared the SARS-CoV-2 disease outbreak a public health emergency of international concern (PHEIC) following a rapid spread of the Sars-CoV-2 infection to other countries across the globe.¹ The outbreak was eventually declared a pandemic by the WHO on March 11, 2020 at a point when the infection had spread to 114 countries and 4,291 people had lost their lives across the globe.² COVID-19 vaccines have since been rolled out with huge disparity between the developing and the developed countries in doses of the vaccines administered thus raising concerns about vaccine nationalism.

COVID-19 remains a major public health threat globally and has challenged healthcare systems and services including oral health. The provision of dental care is severely affected by the COVID-19 pandemic, due to the close proximity of the dental team to patient's mouth and the formation of aerosols by most dental treatment procedures³. Apart from the vaccine rollout, strategies for coping with this prolonged pandemic depend on the effectiveness and resilience of healthcare delivery systems in different countries across the globe. This presents a huge challenge for low and middle income countries (LMICs) such as Nigeria where weak and poor governance structures besides inadequate funding characterize healthcare systems. Since the outbreak of COVID-19, the focus of most countries is on how to prevent the transmission of the virus through observation of non-pharmacological public health measures.

However, another kind of challenge in the form of conspiracy theories has threatened the effectiveness of these public health measures.⁴⁻⁶ Such misleading information in the form of conspiracy theories could engender unhealthy attitudes and behaviours that threaten efforts geared towards controlling the pandemic. For instance, COVID-19 conspiracy theories have been rife among Nigerians.⁴ The most popular COVID-19 conspiracy theories in Nigeria derived mostly from both traditional and social

media are claims that COVID-19 is "an exaggeration by political leaders and media" and "a Chinese biological weapon."⁴ Similar scepticism regarding the reality of COVID-19 was reported even from an advanced economy like the United States of America⁵ and Uganda in East Africa.⁶ A study in the United States found that three in every five Americans believed that coronavirus was created in the laboratory and its threat was being exaggerated.⁵ The notion that coronavirus is an exaggeration, carried by news media was also reported to be very popular in Uganda.⁶ These conspiracy theories appear to have contributed to the low level of compliance with COVID-19 non-pharmacological public health control measures such as donning face mask, social distancing and frequent hand washing and/or use of alcohol-based hand sanitizers among a large segment of the Nigerian populace.⁴

This paper examines the public health and practical challenges facing restorative dental practice in low resource settings that are common with low and medium income countries (LMICs) of the world.

The Challenges of Infection Risk from Aerosols in Dentistry

Aerosol-generating procedures are at the centre of the public health challenges associated with restorative dental services. Most dental practices have in place high standards of personal protection and infection control measures because dental personnel are among the most at risk of any kind of infection transmitted via contaminated aerosols from saliva, blood, other bodily fluids or tissue particles.⁷ From current evidence, we can derive three main pathways for COVID-19 virus transmission in dental practice settings namely: direct transmission when droplets containing the virus are inhaled; transmission via eye, nasal, or oral mucous membranes; and contact transmission through touching of contaminated surfaces.⁸ The generation of aerosols which occurs during most restorative procedures possibly facilitate and amplify these transmission pathways.^{7,9} Thus, dental care services, in particular restorative dental practice have been significantly impacted by the COVID-19 pandemic.¹⁰ This has led public health agencies and professional associations to formulate guidelines to improve infection control measures, personal

protection equipment and to limit dental care to urgent or emergency services.

The Challenges of Infection Control in the Dental Care-Setting

In dentistry, infection control measures are evidence-based and standard operating procedures are usually followed strictly.¹⁰ However, COVID-19 represents the first time in decades that the dental profession has been confronted with a pandemic prompting a need for the profession to rejig existing infection control measures and determine how they may be improved to prevent transmission of the SARS-CoV-2.^{8,10,11-12} Infection control measures include personal protective equipment (PPE) such as the use of facemasks, hand-gloves, goggles and disposable surgical gowns; hand washing; pre-procedural mouth rinses; four-handed dentistry; avoidance of aerosol generating procedures; use of extra-oral radiography and disinfection of all work surfaces and other outside clinical areas commonly touched by staff and patients.^{8,10-13} However, the type of procedure, that is, aerosol versus non-aerosol generating would determine the type of PPE to be donned.^{8,10,11,13-15} Other infection control measures include enforcing full mouth cleaning routines for patients including tooth brushing, use of dental floss, mouth rinses (using special pre-oral antiseptic mouth washes) and soaking the tooth brush in sodium hypochlorite solution for 30 minutes.¹⁶⁻¹⁷ To limit cross infection of the Covid-19 virus, the use of pre-procedural mouth rinses should be routine in the dental practice¹⁶ Personal protective equipment such as facemasks, hand gloves, disposable surgical gowns, goggles or face shields are worn by dental personnel to protect them from coming into contact with bodily fluids, thus preventing cross infection from both aerosol and non-aerosol generating procedures.¹⁶⁻¹⁸

The challenges of infection prevention and control in restorative dental practice in a low resource setting during the COVID-19 pandemic were illustrated in a recent study from Nigeria by Sede et al.¹⁹ The study found that most of the restorative dental procedures carried out involved emergency dental treatment and non-aerosol generating dental procedures. Also

just over half of dental practitioners studied used PPE such as respiratory masks and isolation gowns. The two types of PPE were either generally not available or were limited in availability.¹⁹ The most commonly available PPEs were surgical face masks, hand gloves and face shields. Moreover, less than one-third of dental practitioners were optimally prepared to render restorative dental services.¹⁹ The study also found that majority of the dental practitioners did not use rubber dams routinely in their practice.¹⁹ The use of rubber dams in restorative dental procedures helps provide barrier protection against aerosols thereby limiting or eliminating the spread of micro-organisms from saliva or respiratory secretions of patients. The observations from the study are related to the increased cost of providing dental care in the face of limited available resources coupled with diminished patient turnover.¹⁹ Furthermore, Sede et al noted that besides the financial burden on dental practice in Nigeria, one fallout of the COVID-19 pandemic is the psychological impact on dentists characterized by fear of COVID-19 infection.¹⁹

The Safer Aerosol-Free Emergent (SAFER) Dentistry Concept

Benzian & Niederman³ proposed an innovative approach, the "Safer Aerosol-Free Emergent Dentistry" (SAFER Dentistry) for dental services during and in the post COVID-19 pandemic era. The concept is based on prioritizing the most common patient needs, and systematically selecting bundles of effective, evidence-based, and value-based care that does not require aerosol-generating procedures.³ It allows focus on emergency and urgent dental services while it addresses common care scenarios with a set of bundled interventions.³ Examples of SAFER Dentistry interventions include³:

- Examination and diagnosis through teledentistry which when performed in person includes antiseptic mouth rinse and visual and/or tactile inspection without the use intraoral radiography for investigation.
- Management of acute inflammation such as pain, swelling, or infection, and pulp devitalization/temporary filling for pulpitis with antibiotic therapy and/or local anaesthesia and tooth extraction.

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- Management of toothache due to caries without pulpal involvement with the following; silver-diamine-fluoride application (SDF), glass-ionomer sealants/Atraumatic Restorative Treatment (ART), fluoride varnish/gel, and/or tooth brushing with high fluoride-containing toothpaste (HFT, 5,000 ppm fluoride).
- Management of acute periodontitis with manual scaling and one week course of metronidazole/amoxicillin antibiotic combination.
- Repair of dentures using soft re-line, re-cementation of crown and orthodontic bracket, adjustment of orthodontic wire.

The authors opine that SAFER Dentistry interventions are effective and realistic, even for resource-poor settings and they have actually been used for decades and have been promoted widely.³ In effect the concept is not really an innovation but a re-adaptation of pre-existing interventions. Apart from its cost effectiveness, the approach as the authors posit, would ensure that dental services are not interrupted during a pandemic thus enabling the provision of oral health care for the most recurrent patient needs, while at the same time protecting providers and patients from cross-infection.³ Furthermore, little or no extra training is required to implement the interventions of SAFER Dentistry. In addition, it will enable dental care units to remain functional and still earn income even under pandemic conditions.³ The SAFER Dentistry concept would appear to be an effective tool that will help to mitigate the challenges of restorative dental practice in low resource settings of low and middle income countries.

Healthy System Options for Implementing SAFER Dentistry

Like other pandemics before it, the COVID-19 pandemic is a threat to public health. This has made it clear that the health systems as presently been operated are in no way near perfect^{3,21} With the absence of functional health insurance system in many low-and-middle-income countries, access to dental care services has become an even greater challenge during the COVID-19 pandemic. According to Benzian and Niederman, if SAFER Dentistry is generally available it would reduce the burden on the dental workforce, infrastructure and available

resources. This is because of the reduction in dental facilities for common dental ailments.³ It would also enable dental service providers to remain operative and create income. More importantly SAFER Dentistry would allow dental units to provide a safe and hygienic service environment. The relatively low cost of SAFER Dentistry infrastructure coupled with its cost effectiveness should make the concept attractive to settings with limited resources.

The Challenges of Suboptimal Clinical Guidelines/Standard Operating Procedures (SOPs)

Guidelines and standard operating procedures for the dental team must be well formulated and strictly adhered to because it acts as a guiding principle for clinical work, work space and ensures that both the dental staff and the patients are protected.²² Following the COVID-19 pandemic, international and the United States (U.S.) federal public health agencies, as well as dental professional associations in different countries issued specific guidance for the control of SARS-CoV-2 infection in dental practice.²³⁻²⁶ These recommendations focus on three main areas where adaptation to the pandemic context is required to break potential transmission chains. The three main areas of focus include: patient management and teledentistry which thus prevents sick or infected patients from coming to the clinic; improved infection-control measures which include strict protocols for personal protective equipment (PPE); and limiting of dental care to urgent and emergency procedures only. In the U.S., the Occupational Safety and Health Administration (OSHA) considers aerosol generating work environments as high or very high infection risk areas for COVID-19.²⁷ The United States OSHA also requires 'telephone triage, office engineering controls that include air circulation and patient isolation, universal precautions for airborne pathogens, the use of PPE appropriate for the pandemic, limiting care to urgent and emergency procedures that do not generate aerosols, and environmental cleaning post-care'.²⁷ Such measures that are above the routine dental infection-control procedures require significant infrastructure investments³ which are out of reach for low-and-middle-income countries due to limited resources and costly PPEs. Many of the requirements are difficult to achieve even for the wealthy advanced

nations. For most dental clinics in low-resource settings, the shortage of supplies of PPEs is a persistent challenge, and such enhanced protective measures are near impossible.³ The guidelines provided by the Medical and Dental Consultants' Association of Nigeria (MDCAN) simply require all hospital staff to correctly wear facemasks, gloves, and aprons while on duty and to follow the universal (standard) precautions. It also requires healthcare providers responsible for patients' triage to be fully kitted with PPEs while on duty. The guidelines additionally require that enlightenment posters, handbills, and banners on COVID-19 be issued to hospital staff, patients and patients' relatives.^{26,28} This was particularly important as majority of the Nigerian populace did not believe in the existence of COVID-19.²⁸ The procedural steps to the Nigerian medical and dental consultants' guidelines include pre-registration and triage sitting characterized by at least two metres physical distance between patients. Secondly, all service points/units within the hospital were required to establish a COVID-19 triage point to screen patients for COVID-19 via their medical history and/or physical examinations. The inadequacy of such a screening process that lacks laboratory testing cannot be overemphasized. While Real-time polymerase chain reaction (PCR) screening test is considered the 'gold standard' for the detection of SARS-CoV-2 due to its high sensitivity and specificity,²⁹ it is too expensive to be employed for routine COVID -19 screening. Moreover, it requires specially trained personnel to carry out. However, less expensive COVID-19 antigen based rapid diagnostic screening tests (RDTs) which do not require specialized training to carry out and are approved by the World Health Organization are now available.³⁰ The World Health Organization recommends that rapid antigen tests should be used in the following scenarios: 'in suspected outbreaks where there is no access to PCR testing, including in remote, hard to reach areas; to trace the extent of an outbreak where at least one case is detected through PCR, including in close-contact settings such as prisons; among high-risk groups like health care workers; and in areas with widespread community transmission'.³⁰ The antigen-based COVID-19 RDTs deliver results within 30 minutes of testing and have sensitivity above 80%. They could be deployed in the triage process of restorative dental practice.

However, at a cost of about 25 USD per test, COVID-19 rapid diagnostic testing is still expensive for many in a country like Nigeria where the current minimum monthly wage is less than 75 USD.

Unlike the Nigeria guidelines which were not specific to dental services, Ghana, another LMIC in the West Africa subregion had more comprehensive guidelines and recommendation for dental practices.³¹ The Ghana guidelines require dental clinics and settings to have screening posts for all patients where an evaluating questionnaire is filled; screening/triage officers donning appropriate PPEs and maintaining all existing protocol; observing social/physical distancing protocols of a minimum of 1.5 meters apart. Other aspects of the guidelines include strict booking systems for elective procedures to prevent crowding in waiting areas, compulsory screening of oral health workers, regular disinfection of waiting areas, floors, tables, handles and other surfaces in the clinic area.³¹ Patients symptomatic of respiratory conditions and/or fever were not to be treated without appropriate testing. The Ghana guidelines also specified for all operating dental surgeons and assistants to be fully protected with use of N-95 mask, face shield, gown, boots and hair protection as well as use of single-use scrubs for dental surgeons and assistants during the COVID-19 pandemic.³¹ The guidelines additionally recommend a well-structured sterilizing system for reusable gowns and for patients to rinse and gargle with diluted hydrogen peroxide 1.5% for one minute and/or 2% chlorhexidine for two minutes before clinical procedures.³¹ Significantly, dental chairs and treatment areas were to be disinfected after every clinical procedure.³¹ According to the United States Centres for Disease Control and Prevention (CDC), while PPE is of great use to healthcare workers, care should be taken to designate donning and doffing areas as well as techniques for both.³² It is best at this times to use single-use items as the reuse of disposable items may lead to either contamination or cross infection. In settings experiencing significant shortage of PPEs, they can be reused after careful decontamination.³² The Ghana guidelines appear to align with careful decontamination process for reused gowns. Providing dental care for COVID-19 infected patients ideally should not be done in routine dental offices. It should rather be carried out only in special settings known as Airborne Infection Isolation Rooms

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(AIIRs), specially designed to isolate airborne pathogens to a safe containment area by creating negative differential pressure.³³ Such facilities are not available in low resource settings thus making access to dental care by COVID-19 infected individuals unlikely.

The Role of Telemedicine/Teledentistry Services

Telemedicine can be used for delivery of health-care services when the patient cannot readily access the clinics. Using appropriate technology, the health care provider can ask relevant questions to help arrive at a diagnosis, he can then prescribe treatment and give necessary preventive advice for patient's wellbeing.³⁴ Telemedicine has proved to be effective in reducing the risk of COVID-19 transmission, particularly in the United States of America,³⁵⁻³⁷ the United Kingdom³⁶ China³⁸ and Australia.³⁹ Although the effective use of telemedicine in health-care delivery has been reported by many countries, there is a paucity of information on its use in Nigeria despite the high level of utilization of information and communication technology.⁴⁰⁻⁴¹ According to Ohannessian et al telemedicine is valuable as an information platform for giving instructions for quarantine processes at home, private safety applications, online medical consultation, and patient screening.⁴² However, some challenges have been reported such as definition of national regulations, guidelines,⁴³ framework for developing clinical guidance, and assessment of its impact during outbreaks.⁴⁴

A study in Nigeria found that the most common telemedicine tool was phone call probably due to its easy accessibility coupled with the opportunity to dialogue.⁴⁵ Other studies found patient counselling as the most common treatment provided using telemedicine followed by review of medication.^{43,44} However, many dental cases still require scheduling of face-to-face appointment with the dentist. No doubt telemedicine has made it possible even in this pandemic to continue to deliver valuable patient care.^{43,45-50} Moreover, the SAFER Dentistry approach could permit teledentistry services. According to Benzian and Niederman, a universally available SAFER Dentistry would ensure that hospital personnel, infrastructure, and resources are channelled to where they are most needed.³ There are however, concerns about patient's confidentiality being endangered and exposure of health

practitioners to litigation.⁴⁵ There is therefore the need for formulation of standard guidelines.^{44-45,51-53} In spite of the pandemic, there is the need to maintain the delivery of safe, effective health care services and this would require the establishment of telemedicine guidelines and standards.⁴⁹ There is also a need for training of health-care providers, commitment to regular funding, and long-term sustenance plans to be made by the stakeholders.⁵²

CONCLUSION

The implementation of optimal guidelines and safety protocols for effective COVID -19 infection prevention and control is a major challenge for restorative dental care practice in low resource settings owing to paucity of key material resources and inappropriate behaviour associated with lingering doubts about COVID-19 reality among the majority of the populace. The Safer Aerosol-Free Emergent Dentistry (SAFER Dentistry) concept offers a viable practical approach for restorative dental practice in low resource settings of low-and-middle-income countries during and in the aftermath of the COVID-19 pandemic. There is also a need to deploy all available resources, human and material, in the education and enlightenment of the populace regarding the reality of COVID-19.

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