



## Coronavirus Disease: Implications for Paediatric Dental Care

Oziegbe EO

Department of Child Dental Health, Faculty of Dentistry, Obafemi Awolowo University, Ile-Ife.

Correspondence: Oziegbe EO.

E-mail: elioziegbe@yahoo.com

### Abstract

The recent outbreak of the novel virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused widespread public health concerns. The virus is responsible for the respiratory disease, coronavirus disease (COVID-19), which has rapidly spread to involve many countries in the world. The infection affects adults and children however, symptoms in children seems milder. Transmission occurs primarily through droplet spread or contact route. The unique characteristics of the dental settings makes it focal points for cross infection, this is particularly more serious in paediatric dentistry because the majority of affected children are often asymptomatic or have mild symptoms. This article provides a brief overview of the epidemiology, routes of transmission, and clinical features of COVID – 19 disease in children and implications for paediatric dental care.

Keywords: Coronavirus, Disease, Paediatric, Dental care

### Introduction

Coronavirus disease 2019 (COVID-19) is a new disease that has caused significant consternation in global health care. The disease is caused by the novel coronavirus (2019-nCoV), presently referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)<sup>1</sup>. The previously unknown virus belongs to the coronaviridae family, which consists of single-stranded, positive-sense RNA viruses with a characteristic appearance in negative stain electron microscopy<sup>1</sup>. The virus (SARS-CoV-2) was first isolated in January 2020 from a cluster of patients in Wuhan, Hubei Province, China, who had pneumonia of unknown origin in December 2019. The disease has rapidly spread across China and involved many countries across the continents. On 28 February 2020, a total of 78,961 COVID-19 cases in China and 4,691 cases in 51 countries (and regions) were confirmed<sup>2</sup>. Early March 2020, WHO declared COVID-19 disease a public health emergency of international concern due to the alarming levels of spread and severity<sup>3</sup>. The total number of confirmed cases and death as of 23 July 2020 was 15,012,731 and 619,150 respectively<sup>4</sup>. Despite the global spread of COVID-19, the epidemiological and clinical patterns remain unclear especially in children.

Due to the widespread transmission of SARS-CoV-2 in the community and among health care workers,

dental professionals are at risk for COVID-19<sup>5</sup>. The dental surgeons are considered at highest risk of contracting and transmitting the virus<sup>6</sup>. This can be attributed to the distinctive nature of dental procedures that involves aerosol generation, use of sharps and close face-to-face contact between caregiver and patient<sup>5</sup>. Furthermore, the number of likely contaminated surfaces such as dental chairs, their handles, the spittoon, and dental instruments after carrying out a treatment is high and are possible routes of transmission<sup>7</sup>. The virus (SARS-CoV-2) can be present on surfaces for up to 72 hours<sup>8</sup>. The risk is even more serious in paediatric dentistry because children with COVID-19 are often asymptomatic or present with mild symptoms. Thus, the paediatric dentist is at risk of contracting and spreading the virus to co-workers and family members. Also, patients may contract the infection in the dental setting through cross contamination if adequate safety measures are not applied. It is important that the paediatric dentist is better prepared to identify patients suspected or confirmed of COVID-19 infection and refer appropriately. This article summarizes data on COVID-19 in the paediatric population and its consequences for child dental care.

## Epidemiology

There is considerable variation in the prevalence of COVID-19. Globally, the majority of confirmed cases were among adults with few cases reported in children<sup>9</sup>. Data on the prevalence of COVID-19 among children is limited however available evidence indicates that children below 18 years make up around 2% of total cases worldwide<sup>10</sup>. The first confirmed case among the paediatric population was on 20 January 2020, in a 10-year-old boy from Shenzhen China, whose family had a history of travel to Wuhan City<sup>11</sup>. However, Liu et al.<sup>12</sup> in a retrospective study documented that 6 (1.6%) out of the 366 Chinese children below 17 years hospitalized for respiratory infection with onset between 2 January and 8 January 2020 had COVID-19. It is likely that infections in children were occurring earlier than reported. As of 11 February 2020, data from the Chinese Centers for Diseases Control and Prevention showed that among the 44,672 confirmed cases of COVID-19, 0.9% were aged 0–10 years and 1.2% aged 10–19 years<sup>13</sup>. In the United States, data from 149,082 laboratory-confirmed cases that occurred during 12 February and 2 April 2020 showed that 1.7% were children below 18 years<sup>14</sup>. The low rate in children is not clear, however suggested reasons include reduced number of outdoor activities, lower chance of exposition and active innate immune response<sup>15</sup>. Furthermore, differences in distribution, maturation, and functioning of viral receptors angiotensin-converting enzyme-2 (ACE2), a cell receptor for SARS-CoV-2 may be contributory<sup>13</sup>. Also few tests are conducted in children because they present with milder form of the infection.

## Routes of transmission

COVID-19 is a highly infectious disease in humans. It is mostly transmitted from person to person through respiratory droplets with a sneeze or cough, and direct contact transmission (contacts with oral, nasal and ocular mucous membrane)<sup>16</sup>. It is believed that the virus was transmitted to humans from animals between November and December 2019<sup>17</sup>. The incubation period of SARS-CoV-2 is between 2-14 days with a mean of 5-6 days<sup>18</sup>. The SARS-CoV-2 virus in human cells binds to ACE 2, which is expressed on type I and II alveolar epithelial cells at different levels. It is more expressed in men than women, and different levels are found according to age and race<sup>19</sup>. This may explain the variation in the prevalence of COVID-19 with age, race and sex. It is posited that the binding of the virus to ACE 2 may increase its expression with subsequent damage to alveolar cells<sup>20</sup>. This may explain the respiratory disorder,

which is the major clinical sign of the severe disease<sup>15</sup>. Children often contract COVID-19 after an exposure to an infected adult within or outside the family circle. However, in few cases the source of infection in the child remains unclear. Also children can spread the infection to others, however the extent to which they can transmit the disease is unclear.

## Clinical features

There is limited data on the clinical features of COVID-19 among paediatric population and evidence supports milder symptoms in children compared to adults. Generally, clinical manifestations include dry cough and fever. The clinical spectrum varies from asymptomatic (paucisymptomatic) to symptomatic forms. The symptomatic forms can be divided into three major stages: mild illness characterized by upper respiratory tract symptoms, which more often are the only manifestation of the disease. Recently, loss of taste and/or smell has been observed at this stage. Signs and symptoms of a more serious disease, such as dyspnea, are not present. This stage may progress to a moderate respiratory syndrome, with respiratory signs that include cough and shortness of breath (or tachypnea in children) without signs of severe pneumonia. The severe form of infection is associated with deteriorating signs of pneumonia that include severe dyspnea, respiratory distress, tachypnea (> 30 breaths/min), and hypoxia ( $SpO_2 < 90\%$  on room air). Cyanosis can be observed in children<sup>21</sup>. In Hubei, China over 90% of children were asymptomatic or had mild to moderate symptoms of more than 2000 child patients with suspected or confirmed COVID-19<sup>22</sup>. In a case series of 5 children confirmed for COVID-19 in Kastina, Nigeria; one was asymptomatic, three presented with mild symptoms while one had moderate features<sup>23</sup>.

In the advanced stages of COVID-19, ground glass opacity is observed on chest x-ray<sup>21</sup>. Presently, there is no known cure or vaccine for COVID-19. Supportive treatment is aimed at relieving symptoms.

## Implication for child dental care

The likelihood of contracting and transmitting SARS-CoV-2 in the dental clinic has resulted in the shut down of many clinics and suspension of various dental care services. Gradually, some of the clinics are reopening and many more will reopen in future however, COVID-19 is still present and on the increase. Therefore, it is important that universal precautions are routinely followed to reduce the

spread of the virus. This will help prevent the transmission of SARS-CoV-2 virus to children as well as transmission from infected children to healthcare professionals. Members of the dental team should be educated and trained regularly on infection prevention and control. There is need to practise frequent hand hygiene, appropriate disposal of sharps, safe injection handling and use personal protective equipment (PPE). Sterilization and disinfection of patient-care items and devices are crucial in the prevention of cross infection<sup>7</sup>.

There are no universal guidelines available for dental procedures during epidemics or pandemics<sup>25</sup>. Therefore, treatment should be provided according to local, regional, and national guidelines. However, these guidelines may not cover all possible circumstances thus the Paediatric dentist should determine when it is safe for the child patient, accompanying parent and dental team to have a procedure performed<sup>7</sup>. Presently, the majority of dental bodies recommend that dentists attend only to emergency care (pain, swelling, life endangering dentigerous infection, traumatic dental injuries) and defer elective cases.

Prior to dental visit, all patients should have an initial screening via telephone to identify suspected or possible cases of COVID-19 and also determine those children who require urgent and emergency care. The initial screening involves asking three important questions; any exposure to a confirmed or suspected case of COVID-19, any history of recent travel to an area that has high incidence of COVID-19, and lastly, rule out symptoms of fever or cough<sup>5</sup>. A positive response to any of the three questions should raise concerns and elective dental care should be deferred for at least two weeks. Such patients should contact their physicians on telephone<sup>5</sup>.

On arrival at the dental clinic, patient and accompanying person should be provided with face masks and wash their hands with water and soap or apply an alcohol based hand sanitizer. All patients should complete a medical history checklist, COVID-19 screening questionnaire and emergency checklist<sup>5</sup>. The child patient should have his/her body temperature measured using a non-contact forehead thermometer. Patients with fever of 38°C and above with or without respiratory symptoms should have elective treatment deferred for at least two weeks<sup>5</sup>.

In situations where the dentist must offer assessment and/or treatment on a face-to-face basis all necessary

precautions should be observed. The least invasive treatment possible should be performed and avoid aerosol generating procedures (AGP)<sup>7</sup>. During treatment the dentist and dental assistant should use the highest level of personal protective equipment (PPE) available. This includes gloves, gown, head cover, shoe cover, eye protection including goggles or a disposable/reusable face shield that covers the front and sides of the face, and a N954 or higher-level respirator. In situations where a respirator is not available, a combination of a surgical mask and a full-face shield can be used<sup>26</sup>. It is recommended that patient carry out preprocedural mouth rinse with 0.5–1% hydrogen peroxide as it might reduce the load of coronavirus in saliva<sup>5</sup>. There should be adequate documentation of all precautions put in place to reduce the risk of cross-infection during treatment<sup>25,8</sup>.

Most aerosol generating procedures (AGP) in paediatric dental clinic are related to caries. This implies that the treatment of carious lesions will shift from AGP to minimally invasive procedures while viral transmission risk remains high. These procedures include atraumatic restorative treatment (ART), sealing in carious lesions using fissure sealants, silver diamine fluoride, selective caries removal, and the Hall Technique<sup>7</sup>. However, in extreme situations, extraction may be the preferred treatment option for children with pulpal symptoms (primary dentition) to reduce the need for aerosol generating procedures<sup>24</sup>. Furthermore, there is need to emphasize prevention of caries in children. This includes the importance of twice daily brushing and use of fluoridated toothpaste, and reduction of refined sugar consumption.

## Conclusion

The paediatric dentists should understand the implications of potential transmission of the (SARS)-CoV-2 virus in the dental clinic. Thus, it is important that they are well informed of new information regarding this disease. It is crucial that universal infection control procedures are followed to the highest level to prevent the risk of cross infection. Furthermore, they need to strike a balance between the safety of the healthcare professionals yet providing optimum dental care to the patients requiring emergency intervention.

## References

1. Guarner, J. Three emerging coronaviruses in two decades: the story of SARS, MERS, and now COVID-19. *Am J Clin Pathol* 2020;153(4):420-421.
2. WHO [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=5bbf3e7d\\_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=5bbf3e7d_4)
3. WHO [https://www.who.int/dg/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-\(2019-ncov\)](https://www.who.int/dg/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-(2019-ncov)).
4. WHO <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>
5. Ather A., Patel B., Ruparel NB., Diogenes A., Hargreaves KM. Coronavirus disease 19 (COVID-19): implications for clinical dental care. *J Endodont* 2020;46(5):584-595.
6. Coulthard P. Dentistry and coronavirus (COVID-19)-moral decision-making. *Br Dent J* 2020;228(7):503-505.
7. Mallineni SK., Innes NP., Raggio DP., et al.. Coronavirus disease (COVID-19): characteristics in children and considerations for dentists providing their care. *Int J Paed Dent* 2020;30(3):245-250.
8. van Doremalen N., Bushmaker T., Morris DH., et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARSCoV-1. *New Eng J Med* 2020. <https://doi.org/10.1056/NEJMc2004973>
9. Cai J, Xu J., Lin D. et al. A Case series of children with 2019 novel coronavirus infection: clinical and epidemiological features. *Clinical Infectious Diseases* 2020. Doi:10.1093/cid/ciaa198.
10. RCPCH Research & Evidence team. COVID-19-research evidence summaries. *Roy Coll of Paed Ch Hlth.* 2020 May.
11. Chan JF, Yuan S., Kok KH. et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person to- person transmission: a study of a family cluster. *The Lancet* 2020; 395:514-523.
12. Liu W., Zhang Q., Chen J. et al. Detection of COVID-19 in children in early January 2020 in Wuhan, China. *New Eng J Med* 2020;382:1370-1371.
13. Lee PI., Hu YL., Chen PY. et al. Are children less susceptible to COVID-19?. *J Microbiol Immunol Infect* 2020;53(3): 371–372.
14. Biale, S., Gierke R., Hughes M et al. Coronavirus Disease 2019 in Children—United States, February 12–April 2, 2020. *Morbidity and Mortality Weekly Report.* 2020; 69(14):422-426.
15. Pavone P., Ceccarelli M., Taibi R. et al. Outbreak of COVID-19 infection in children: fear and serenity. *European Review for Medical and Pharmacological Science* 2020;24:4572-4575.
16. González-Olmo MJ., Ortega-Martínez AR., Delgado-Ramos B. Perceived vulnerability to Coronavirus infection: impact on dental practice. *Brazilian Oral Research* 2020; 34. <http://dx.doi.org/10.1590/1807-3107bor-2020.vol34.0044>
17. Heymann DL., Shindo N. COVID-19: what is next for public health?. *The Lancet* 2020;395(10224):542-545.
18. WHO [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7\\_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-covid-19.pdf?sfvrsn=5ae25bc7_4).
19. Backer JA., Klinkenberg D., Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020. *Eurosurveillance*, 25(5) DOI:10.2807/1560-79.ES.2020.25.5.2000062
20. Sun P., Lu X., Xu C. et al. Understanding of COVID-19 based on current evidence. *J Med Virol* 2020;92(6):548-551.
21. Cascella M., Rajnik M., Cuomo A. et al. Features, evaluation and treatment Coronavirus (COVID-19); StatPearls Publishing: Treasure Island, FL, USA, 2020.
22. Bi Q., Wu Y., Mei S., et al. Epidemiology and transmission of COVID-19 in Shenzhen China: analysis of 391 cases and 1,286 of their close contacts. *medRxiv.* 2020. <https://doi.org/10.1101/2020.03.03.20028423>.
23. Ibrahim OR., Suleiman BM., Sanda A., et al.. COVID-19 in children: a case series from Nigeria. *The Pan African Medical Journal.* 2020 <https://www.panafrican-med-journal.com/content/series/35/2/53/full>
24. Ferrazzano GF., Ingenito A., Cantile T. COVID-19 Disease in children: what dentists should know and do to prevent viral spread. *The Italian point of view. Int J Environmen Res and Pub Hth* 2020; 17(3642):1-6.



25. Smales FC., Samaranyake LP. Maintaining dental education and specialist dental care during an outbreak of a new coronavirus infection. Part 1: a deadly viral epidemic begins. *Br Dent J* 2003; 195:557-561.
26. Centers for Disease Control and Prevention, Interim Infection Prevention and Control

Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings, Centers for Disease Control and Prevention, Atlanta, GA, USA, 2019, <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html>.