International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 06(C); June 2020; Page No.22508-22511
DOI: http://dx.doi.org/10.24327/ijcar.2020.22511.4444

Research Article

DYNAMICS OF TRANSMISSION, DIAGNOSIS, PREVENTION & EMERGENCY CARE DURING COVID-19- IN DENTAL PEDIATRIC PATIENTS

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A R T I C L E I N F O

Article History:
Received 06th March, 2020
Received in revised form 14th April, 2020
Accepted 23rd May, 2020
Published online 28th June, 2020

Key words:
Corona Virus, Paediatric Dentistry, SARS COV-2, MERS-CoV, Pandemic

A B S T R A C T

Corona virus disease (COVID-19) has been declared a worldwide pandemic. Although the incidence is increasing every day, a significantly smaller number of pediatric cases have been reported compared to adults population. The novel corona virus presents unprecedented challenges to the healthcare industry with its rapid transmission and unknown characteristics. No specific treatment modalities are available, hence social distancing and proper respiratory and hand hygiene are key to avoiding transmission. Dental professionals are at high risk as almost all dental procedures generate aerosols, and droplet and contact transmission may also occur. Stringent protocols, precautions and triaging of patients should be adopted in dental care during the pandemic. It is also important that all dental team members should ensure about the understanding of current guidance and act upon their professional responsibility.

INTRODUCTION

Corona viruses are enveloped single-stranded RNA viruses that are zoonotic in nature and cause symptoms ranging from those similar to the common cold to more severe respiratory, enteric, hepatic, and neurological symptoms.[1] Other than SARS CoV- 2, there are six known corona viruses in humans: HCoV-229E, HCoV-OC43, SARS-CoV, HCoVNL63, HCoV-HKU1 and MERS-CoV. Corona viruses have caused two large-scale pandemics in the last two decades: SARS and MERS.[2] The official name of novel corona virus was announced as COVID-19 by World Health Organization (WHO).[3]

In Wuhan City (China), the first four cases of an acute respiratory syndrome of unknown etiology were reported on 29th Dec, 2019. It was observed that the most of the early cases had contact history with a seafood market. Soon afterwards, human-to-human close contact transmission was found. [4] After the initial reports of infection, in the following several weeks, COVID-19 outbreaks were reported in South Korea, Iran and Italy followed by several other European, Asian, North and South American countries.

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COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. Till 4June 2020, Worldwide, 6,575,174 confirmed cases including 388,059 deaths and 3,171,783 recovered were reported by World Health Organization (WHO). In India 216,919 confirmed cases with recovery of 104,107 and deaths of 6,075 were reported till date. Compared to adults, there have been significantly less reported cases of COVID-19 in the pediatric population. It is approximated that less than 1% of pediatric younger than 10 years old are infected by COVID-19 outbreak [5], which is almost 2.4% for those less than 18 years old .[6] The mortality rate of COVID-19 among children under 10 years old is almost zero.[7] As of February 2020, 2.4% of the 75,465 cases (confirmed and suspected) in China were reported in the pediatric population. Till date, 3092 paediatric cases have been reported to have tested positive, and 1412 children were suspected of being infected with COVID-19.[8] A survey of 1391 children in China found 171 (12.3%) cases tested positive for SARS-CoV-2.8.[9] An analysis of more than 2000 child patients with suspected or confirmed COVID-19 in Hubei, China, found that over 90% presented as asymptomatic or with mild to moderate symptoms.[10] An overall fatality rate of 1.36%-15% has been reported among COVID-19 patients.[11] As of 31 March 2020, seven fatalities have been reported in paediatric population due to COVID-19.[8] Paediatric

dentistry is in a unique position in the corona virus pandemic. Children may act as asymptomatic carriers of the virus.[12] It usually affects individuals between 25 and 89 years of age with a slight predilection for males; however, no generalizations can be made.[2] A lower incidence has been reported in children and this might be due to the fact that children are generally well cared for and thus at lower risk for exposure to infected people. Other possible reasons are immature ACE 2 receptors, presence of antibodies to different viruses especially in the winter months when they get multiple upper respiratory tract infections and a developing immune system which reacts differently to the virus.[13] A general observation is that older age and existence of underlying co-morbidities (e.g. respiratory disease, hypertension and cardiovascular disease) are associated with poorer outcomes.[14] This article looks to review routes of transmission, clinical characteristics in children, clinical diagnosis and emergency care derived from the limited published literature that are specific to the pediatric population to provide a review for the pediatric practitioner and guide in part towards the creation of an interim algorithm for the management of COVID-19 in the pediatric population.

Routes of Transmission

Direct or Indirect Transmission: The virus can be passed directly from person to person by respiratory droplets; emerging evidence suggested that it may also be transmitted through contact and fomites.

Contact Transmission (contact with oral, nasal, and eye mucous membranes). In addition, studies have shown that respiratory viruses can be transmitted from person to person through direct or indirect contact, or through coarse or small droplets and it can also be transmitted directly or indirectly through saliva.[15]

Clinical Characteristics of COVID-19 in Children

The clinical symptoms of COVID-19 are still being documented , although the majority of affected patients exhibit symptoms including a dry cough which is usually accompanied by fever.[16] Difficulty in breathing, fatigue, and other less typical symptoms can also occur.[17,18] Signs and symptoms include different stages as asymptomatic, mild, moderate, severe, and critical.[13] It is believed that COVID-19 is an asymptomatic infection or with mild and nonspecific symptoms among infants and children.[19] Children tend to present with similar but milder symptoms to adults. Neonates born to mothers with COVID-19 may have problems, such as thermal instability, respiratory distress, abnormal liver function and thrombocytopenia.[5] The infected neonates and infants may present with fever, mild respiratory symptoms, like dry cough, distress, nasal discharge, sore throat, and fatigue.[20] The gastrointestinal tract may also be affected resulting in abdominal discomfort, diarrhea, vomiting and feeding intolerance. [21, 22] Children with underlying diseases, such as malignancies, cirrhosis, chronic kidney disease, cardiovascular or pulmonary diseases or immunosuppression may experience more severe symptoms, like respiratory distress syndrome, septic shock, deep acidosis and respiratory or even cardiovascular collapse. [22, 23]

Diagnosis of COVID-19 Infection In Pediatrics

Most of the confirmed children with COVID-19 have diagnosed by family clusters.[19] All neonates born to mothers with COVID-19 should be isolated and screened.[21, 24] It is adviced to stop breastfeeding in mothers with confirmed COVID-19.[25] For all suspected patients of COVID-19, Nucleic Acid test (NAT) or real-time polymerase chain reaction (PCR) combined with new fluorescent techniques are suggested as the gold standard diagnostic methods.[21, 25, 26] These tests are considered as gold standard tools for COVID-19 diagnosis but they are time-consuming, may not be accessible widely, with highly probable false-negative results, which can be improved by repeated sampling.[19] In vulnerable children it is suggested to combine all findings obtained from a history of contact, clinical characteristics, blood cell count and chest CT scan with NAT/PCR test as the standard diagnostic protocol.[26, 27] Sampling can be done by nasopharyngeal swab (Dacron or rayon sterile swab is preferred).[22,25,27] Detection rate for broncho-alveolar lavage specimen is supposed to be higher, however, the procedure will increase the cross-contamination and cross-infection risk.[21] The blood sample or fecal specimens have shown positive for COVID-19 in PCR test among some cases. [25]

Prevention

In India both the Dental Council of India (DCI) and Indian Dental Association (IDA) also currently advise against elective dental procedures.[28,29] They advise obtaining proper health and travel history and contact details of all patients. Patients with respiratory infections (current or in the last 48 hours) and those with travel history to COVID-19-affected regions should be reported to the health department and should be rescheduled. Physical barriers in reception areas and proper personal protective equipment (PPE) should be used to limit close contact with infectious patients. Use of rubber dams, high-volume evacuation and proper sterilization protocols after each patient. A 1% hydrogen peroxide (or a 0.2% povidone) solution should be used as a pre-procedural mouth rinse. Patient should be educated about frequent hand washing lasting at least 20s with soap and water, use of hand sanitizers with at least 60-95% alcohol, avoiding touching mucosal surfaces (mouth, nose, eyes) with unwashed hands, practicing proper cough etiquette, wearing a face mask (if symptomatic), limiting exposure to affected people and maintaining a distance of at least 2 m from others are the suggested preventive steps. The reusable instrument and items should be pretreated, cleaned, sterilized and properly stored. Double layer yellow color medical waste package bags should be used after treating COVID-19 patients and should be properly disposed of using a 'gooseneck' ligation.[16]

Emergency Care

The American Association of Paediatric Dentistry (AAPD) [30] has been updating regular treatment protocols. According to AAPD advises paediatric dentists should postpone all elective procedures for at least 3 weeks but to continue emergency or urgent care. They also suggest that elective general anaesthesia cases be postponed so that operating room resources are not stressed. There are two specific areas which is especially important for our pediatric dental practices that require triage and possible re-prioritization in this time of limited access and potential infectivity-

Treating Emergencies -Pediatric dentists around the country have taken different approaches to the management of dental emergencies in children. An algorithmic approach to determining medical and dental emergencies is one proposed by *Meyer et al.,* and may be helpful to pediatric dentists seeking to provide human care in this time of crisis, yet minimize possible exposures to the COVID-19 virus.

Managing Hospital and Office-Based General Anesthesia Cases- Hospitals across the country are looking at elective surgeries and encouraging or mandating providers to triage those cases so that operating room resources are not stressed and or personnal are not unnecessarily exposed to COVID-19. Pediatric dentists are encouraged to review pending cases to determine if children can be delayed access to the operating room until this crisis abates. Clearly, children in pain, with acute facial swelling or with significant traumatic injury may require treatment under general anesthesia. Again, the decision to provide care is dependent on patient need, local restrictions and available alternative care approaches such as antibiotics and pain medication.[31]

Dental emergencies are potentially life threatening and require immediate treatment to stop ongoing tissue bleeding, alleviate severe pain or infection. Conditions include uncontrolled bleeding, cellulitis or a diffuse soft tissue bacterial infection with intra-oral or extra-oral swelling that potentially compromise the patient's airway, trauma involving facial bones, potentially compromising the patient's airway. To alleviate the burden on hospital emergency departments urgent dental care focuses on the management of conditions that require immediate attention to relieve severe pain and/or risk of infection. These should be treated as minimally invasively as possible.

- Severe dental pain from pulpal inflammation
- Pericoronitis or third-molar pain
- Surgical post-operative osteitis, dry socket dressing changes
- Abscess, or localized bacterial infection resulting in localized pain and swelling
- Tooth fracture resulting in pain or causing soft tissue trauma
- Dental trauma with avulsion/luxation
- Dental treatment required prior to critical medical procedures
- Final crown/bridge cementation if the temporary restoration is lost, broken or causing gingival irritation
- Biopsy of abnormal tissue[32]

The International Association of Paediatric Dentistry [33] has also made recommendations for parents to maintain optimal oral health of children and avoiding dental clinic visits:

- Brush twice daily with fluoridated toothpaste.
- Taking only water between meals.
- Milk and juices should be taken at meal times only.
- Limiting snacking—not to eat more than five times during the day (breakfast, snack, lunch, snack and dinner).
- Less consumption of sugar-containing foods. Chewy sweets, candy which stick in the mouth for extended periods should be avoided.
- Healthy eating habits should be adopted as they not only prevent cavities but improve weight and a healthier childhood.
- Parents should remain in touch with their paediatric dentist in case they have any queries about oral health or require assistance.

CONCLUSIONS

In children clinical manifestations of COVID-19 are generally less severe than those of adult patients, young children and particularly infants, remain endangered to infection and pose a significant transmission risk. During this pandemic dentists who treat children should enact universal infection control procedures t. Opportunities to promote preventive dental behaviours should be taken. Throughout the pandemic, in future and when practice restrictions ease contemporary, minimally invasive procedures that minimize or eliminate aerosol generation should be employed where intervention is indicated.

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How to cite this article:

Dr Nivedita *et al* (2020) 'Dynamics of Transmission, Diagnosis, Prevention & Emergency Care During Covid-19- in Dental Pediatric Patients', *International Journal of Current Advanced Research,* 09(06), pp. 22508-22511.
DOI: http://dx.doi.org/10.24327/ijcar.2020. 22511.4444

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