

COVID 19 and Pediatric Dentistry- A Narrative Review

Aparna Hegde¹, Prashant Babaji², Shashibhushan K.K.³

¹Post graduate, ²Professor, ³Head of the Department and Professor, Department of Pediatric and Preventive Dentistry, Sharavathi Dental College, Shimoga, Karnataka

Abstract

During the present health emergency linked to the pandemic caused by corona virus(COVID 19), the efficient and safe management of children's oral health presents a challenge to paediatric dentists. These challenges can be overcome by emphasizing on the oral disease prevention methods, and by treating paediatric dental emergencies efficiently. Along with rigorous and highly effective infection control protocols in dental clinical setups, working on remote communication and health education aimed at maintaining the oral health of the children assumes great importance. This article, after analysing the risk factors associated with pediatric dental treatment due to COVID-19, presents a series of oral health promotion strategies, management strategies for pediatric dental emergencies and of dental non emergencies. New approaches and models of treatment based on remote interaction techniques will be discussed, which can be further modified and used accordingly even after the end of the pandemic.

Keywords: covid-19, pediatric dentistry, pedodontics, preventive dentistry, non aerosol generating procedure

Introduction

During the COVID-19 period, treating a child in the dental clinic will pose a challenge to a pediatric dentist. The challenges vary from reception of the child to oral check-up to treatment. The risk of cross infection to the child will be present from the moment the child enters the clinic. Therefore oral health promotion by the dentist attains a significant value in the management protocol. Management of dental emergencies and oral pathologies which are not emergency by nature also is a great challenge. The main objectives while treating a patient are effective and efficient treatment methods without compromising behaviour management, reducing the risk of cross infection to the child and finally reducing our potential exposure. Therefore, it will be the duty of the pediatric dentist to invest and focus on effective infection control materials and protocols without compromising

the standard of care to the patient and also work on communication and health promotion strategies for children.

This article reports data on the paediatric population affected with COVID-19 and emphasises the importance of following relevant safety measures to protect dental care professionals, the child patient, and also the affected children. We urge the practitioners to actively and regularly seek reputable and reliable source of information to keep themselves updated on the latest protocols to be followed for a safe and efficient treatment of the child patient.

Epidemiology and Risk Factors Involved in Pediatric Dentistry

Reviewing published literature, Xia et al. noted 65% of the affected patients to be male within their subset of 20 pediatric inpatients with COVID-19 infection¹. The age range within this group of affected patients was one day to 14 years with a median age of two years. Seventy percent of the affected patients within this subset were under the age of three years. One of the patients had a history of epilepsy as a sequela of previous viral encephalitis and two patients had a history of atrial septal defect (ASD) repair surgery. The authors noted five further patients with a history of congenital or acquired

Corresponding author:

Dr. Aparna Hegde

Post Graduate, Department of Pediatric and Preventive Dentistry, Sharavathi Dental College, Shimoga, Karnataka, Email Id: aparna9h@gmail.com

diseases (unspecified within the reported study), which the authors purported to indicate that children with underlying diseases would have a greater susceptibility to COVID-19. Jiehao et al. noted within their study that the mean incubation period in their set of pediatric patients from household exposure to an asymptomatic adult case was six and a half days, which they noted to be suggestive of a longer incubation period than what is being reported in adults.² Dong et al., in their pre-publication release data looking at the epidemiology of COVID-19 among children in China, reviewed 2143 cases of which 731 were laboratory confirmed and 1412 were suspected cases. They found the median age among these cases to be seven - years with 56.6% of the cases being boys.³ Overall, the epidemiological data suggests a slightly higher percentage of affected cases to be male. The age range of affected patients is wide, with concern regarding a higher propensity of illness in patients with pre-existing diseases. This may represent either worse symptoms resulting in a higher rate of testing or may indicate an increased susceptibility to illness with underlying disease.

Genetic and epidemiological research reports that the COVID-19 epidemic started with a single transmission from animal to man, followed by an important human-to-human transmission.^{4,5} The human-to-human transmission of COVID-19 occurs mainly through respiratory droplets in air suspension and aerosol and direct or indirect contact.^{6,7}

A particular source of concern is the paucity of data on the vertical transmission potential of COVID-19 pneumonia in pregnant women.⁸ Chen et al. retrospectively reviewed the medical records for nine pregnant women with laboratory-confirmed COVID-19. The evidence of intrauterine vertical transmission through testing for the presence of SARS-CoV-2 in amniotic fluid, cord blood, and neonatal throat swab samples was assessed. Breastmilk samples were also collected and tested from patients after the first lactation.⁸ They noted within this subset of patients that the clinical characteristics of the disease were similar in pregnant and non-pregnant adults and that they did not note any evidence of intrauterine infection caused by vertical transmission in women who develop COVID-19 pneumonia in late pregnancy.⁸

The clinical symptoms of COVID-19 are still being documented and collated, although the majority of affected patients exhibit symptoms including a dry

cough which is usually accompanied by fever.⁹ Difficulty in breathing, fatigue, and other less typical symptoms can also occur.^{10,11} Signs and symptoms include different stages as asymptomatic, mild, moderate, severe, and critical. Children tend to present with similar but milder symptoms to adults.³

Xia et al. noted in their study of pediatric COVID-19 cases that eight (80%) patients had a fever, six (60%) had a cough, four (40%) had a sore throat, three (30%) had a stuffy nose, and two (20%) had sneezing and rhinorrhea. None of the patients had diarrhea or dyspnea during their illness.² Xia et al. report the presence of fever, which was defined as axillary temperature over 37.3°C in 12 cases (12/20, 60%), cough in 13 cases (13/20, 65%), diarrhea in three cases (3/20, 15%), nasal discharge in three cases (3/20, 15%), sore throat in one case (1/20, 5%), vomiting in two cases (2/20, 10%), tachypnea in two cases (2/20, 10%), and fatigue in one case (1/20, 5%).¹ They also further noted physical exam findings when assessed by medical personnel to be rales in three cases (3/20, 15%), retraction signs in one case (1/20, 5%), and cyanosis in one case (1/20, 5%).¹

Dong et al. characterized, in looking at their data of 2143 pediatric patients with laboratory diagnosed and/or clinically suspicious cases of COVID-19 infection, the severity of illness as asymptomatic, mild (predominantly upper respiratory tract infection symptoms with no frank respiratory distress), moderate (presence of pneumonia, frequent fever, and cough but with no obvious hypoxemia), severe (presence of dyspnea with central cyanosis, oxygen saturation <92% with other hypoxia manifestations) and critical (acute respiratory distress syndrome (ARDS), respiratory failure, shock, encephalopathy, myocardial injury, heart failure, coagulation dysfunction, and organ dysfunction).³ With these clinical parameters, they found 4.4% of cases to be asymptomatic, 50.9% of cases to be mild, and 38.8% of the cases to be in the moderate range accounting for 94.1% of all cases.³ They also noted the proportion of severe and critical cases to be inversely proportional to the age range, with the age group of less than one year old having 10.6% of the severe and/or critical cases.³

Incubation period

The average incubation period for COVID-19 has been projected to be 5 to 6 days, although there is evidence that it can last as long as 14 days, which is now the widely accepted length for medical monitoring

and quarantine of potentially exposed individuals.¹² Transmission from asymptomatic COVID-19 carriers is also possible⁹

What Comes Under Urgent Dental Care?

The following presenting conditions require urgent paediatric dental care¹³:

1. Presence of a swelling likely to or compromising swallowing and/or breathing, causing trismus or extending to the eye or a significant oral/facial swelling with associated pyrexia.

2. Traumatic dental injuries resulting in a complex injury to the permanent dentition: avulsion of a permanent tooth; severe luxation (tooth displaced, mobile, and/or interfering with occlusion), crown root fracture (coronal portion displaced, mobile and/or interfering with occlusion), complicated crown fracture (pulp exposed).

3. Traumatic dental injuries to the primary dentition resulting in pulp exposure or severe luxation such that tooth mobility constitutes a potential airway risk and/or is severely interfering with occlusion/function.

4. Uncontrolled bleeding which has not responded to self-care measures.

5. Severe dental pain (irreversible pulpitis) which has not responded to over the counter analgesics and is impacting on eating and sleeping.

Priority should be given to¹⁴:

1. children with underlying medical conditions that place them at greater risk of complications arising from any subsequent infection if the tooth is not treated (see 'red flag' list below).

2. children with additional needs such as those with learning disabilities or autism, where dental pain is having a severe impact on the child/family with evidence of adverse behaviours such as self-harming.

The list below, although not exhaustive, provides examples of potential 'red flag' conditions that may exacerbate/complicate a child's present dental condition and should be taken into consideration when justifying the need for urgent dental care:

1. Increased risk of bleeding from medications

or conditions (eg chronic renal failure, liver disease, haematological malignancy, recent or current chemotherapy, idiopathic, inherited bleeding disorders including all types of haemophilia and von Willebrand's disease)

2. Increased risk of infection (eg any immunocompromised state, transplant patient, diabetic, the child on immunosuppressants /steroids/ chemotherapy)

3. At the risk of infective endocarditis

4. Additional needs eg an infant or child with communication or behavioural needs (eg severe autism) that potentially places them and their families at greater impact from dental symptoms.

Additionally, some children are identified as being at significantly increased risk from COVID-19. These children should not attend a hospital or dental clinic environment unless the dental condition is considered 'life' threatening.'

1. Long term respiratory conditions, including chronic lung disease of prematurity with oxygen dependency, cystic fibrosis with significant respiratory problems, childhood interstitial lung disease, severe asthma, respiratory complications of neurodisability

2. Immunocompromise (disease or treatment), including treatment for malignancy, congenital immunodeficiency, immunosuppressive medication including the long term (>28 consecutive days) of daily oral or IV steroids (not alternate day low dose steroid or hydrocortisone maintenance), post-transplant patients (solid organ or stem cell), asplenia (functional or surgical)

3. Haemodynamically significant and/or cyanotic heart disease

4. Chronic Kidney Disease stages 4, 5 or on dialysis

The impact of the COVID-19 outbreak on dental services

In dental settings, oral fluids from the patient or contaminated dental instruments or

environmental surfaces create a potential way of spreading the virus to the operators and other patients. While the previous transmission pathways are common

to the treatment of any dental patient, pediatric patients present additional risks of transmission: the use of removable orthodontic appliances or auxiliary elements in fixed orthodontic therapies, such as the use of intermaxillary elastic bands, entails risks of contamination if handling is not carried out with due precautions.¹⁵

Another problem is related to the difficulty for the child to use/endure personal protective equipment (PPE) during medical visits. Finally, the very presence of caregivers, with whom the pediatric dentist must unavoidably interface, will increase the risk of infection.¹⁶

Patient management and prevention of infection, the American Dental Association proposed on March 16, 2020, that dentists defer all elective procedures and offer just the dental emergency treatment.¹⁷

1- Tele-screening

Primary telephone screening to recognize suspected patients or probable COVID-19 infection can be remotely done during scheduling appointments. Questions related to primary telephone screening could be any travel history to COVID-19 infected regions and the existence of febrile respiratory illness (FRI) symptoms such as cough and fever. A positive answer to any of these two questions would increase the initial concern and postpone the elective dental care for at least two weeks.¹⁸

2- Patient assessment and care protocol

- Patients should fill out a comprehensive medical history form, a questionnaire of COVID-19 screening, and evaluation of a true emergency questionnaire.

- Dental practitioners should evaluate the body temperature of a patient via a non-contact forehead thermometer or cameras with infrared temperature sensors. Elective dental treatments for patients with a fever over 100.4°F (or 38 °C) and/or signs of respiratory disease should be postponed for at least 2–3 weeks.¹⁵

- Individuals with suspected COVID-19 infection will be seated in a distinct, well-ventilated waiting room at least 6 feet away from patients receiving treatment who are not infected based on the guidelines of the Centers for Disease Control and Prevention (CDC).

- Patients should wear a surgical mask and practice appropriate respiratory hygiene, for example, use a tissue to cover their mouth and nose when coughing or

sneezing, and then throw the tissue away.

- Apply 70% ethanol to clean and disinfect the medical kits (blood pressure cuffs, thermometers, etc.).¹⁵

- Advise the patients to do self-quarantining and inform their physician to avoid the COVID-19 risk.

3- Pharmacologic treatment

An option is a pharmacologic treatment by antibiotics and/or analgesics for suspected or confirmed COVID-19 cases who need immediate dental treatments for conditions such as swelling and/or tooth pain. This method may provide the relief of symptoms and give dental practitioners some time to come up with a plan to perform dental care to minimize the infection spread. The British Medical Journal prescribed acetaminophen as analgesia instead of ibuprofen for COVID-19 infected patients because ibuprofen can interfere with the immune system function.¹⁸

4- Dental treatment guidelines

Some cases such as progressive fascial space infection or dentoalveolar trauma would certainly require emergency dental treatment. For suspected or confirmed COVID-19 cases, dental professionals should consider the following guideline:^{18, 19, 9}

• Hand hygiene

People are now more aware of handwashing importance to prevent acute respiratory infections. According to WHO, hand hygiene involves either cleaning hands with an Alcohol-Based Hand Rub (ABHR) or water and soap; both have the same efficiency. If the hands are visibly soiled with dirt, blood, and/or body fluids, water and soap should be used; otherwise, ABHRs are recommended. Before touching a patient and any cleaning or aseptic action, and after having contact with body fluid, touching a patient, and touching the surroundings of a patient, hand hygiene should be done.¹⁵

• Personal protective equipment (PPE)

During dental procedures, the spread of oral microorganisms mainly moves towards the face of the dentist, especially in the eyes and all around the nose, which are critical parts for the transmission of infections. PPE may create an efficient block against most potential dangers of aerosols produced from the operative area.

- **Protective glasses and face shields:** There is clinical proof that since infectious droplets could readily attack the epithelium of human conjunctival, COVID-19 can be transferred by contact with the mucous membranes lining the eyes. Therefore, protective glasses or face shield should be used during the treatment to cover the eyes from aerosols and debris produced throughout dental treatment and they also should be disinfected between patients' visits.

- **Face masks:** A medical mask (surgical or procedure mask) should be worn while operating at a distance of fewer than 1 m from the patient.

A particulate respirator that is at least as secure as a National Institute for Occupational Safety and Health-certified N95, European Standard Filtering Face Piece 2 (EU FFP2), or equivalent, was used when running aerosol generation methods. When performing emergency dental treatment with suspected COVID-19 cases, a higher level of respiratory protection should be considered, such as EU FFP3 respirators conforming to European Standard 149 (EN149). A higher level of respiratory safety such as EU FFP3 respirators comply with European Standard 149 (EN 149) is required if the patient is a suspected or confirmed COVID-19 during emergency dental treatment.¹⁵

- **Pre-procedural mouth rinse**

One of the most efficient ways to decrease the proportion of microorganisms in oral aerosols is pre-procedural mouth rinse. According to a meta-analysis by Marui, pre-procedural mouth rinse including chlorhexidine (CHX), cetylpyridinium chloride (CPC), and essential oils led to a mean reduction of 68.4% colony-forming units (CFU) in dental aerosols.²⁰ Approximately 0.12% CHX has been used as a pre-procedural mouth rinse. If a patient experiences any other side effects such as tongue stain or mucosal irritation, 0.05% CPC can be a suitable option.

- **Radiographs**

Extra-oral imaging such as panoramic radiograph or cone-beam computed tomography (CBCT) should be used to prevent the cough or gag reflex that happened during intraoral imaging. When intraoral imaging is required, sensors should be double-covered to avoid cross-contamination and perforation.

- **Rubber dam**

Using a rubber dam reduces splatter production. Rubber dam must be used during endodontic treatment and in pediatric and restorative dentistry when rotary instrumentation is needed. Also, using a rubber dam during fixed partial denture or single-crown preparation should be taken into consideration. For instance, prepare a supra-gingival margin for the posterior bridge or apply a split dam technique. Additionally, it can be beneficial to locate the rubber dam to cover the nose and reduce the transmission of COVID-19.

- **Single-use tools**

Dentists should apply single-use devices for example syringes, mouth mirror, and blood pressure cuff to avoid cross-contamination.

- **Reduce aerosol production**

Effective treatment should decrease the aerosol generation. Ultrasonic instruments, for instance, can place a higher risk of producing contaminated aerosols. Since hand and ultrasonic instrumentation are both equally successful in eliminating plaque and calculus, it is suggested to manually scale and polish them. Furthermore, the use of high-speed handpieces and three-way syringes should be minimized by dentists during the COVID-19 outbreak. Dentists should minimize utilizing rotary instruments when preparing a cavity and in selective patients, they should try using atraumatic restorative procedures, chemomechanical caries removal, or caries arresting agents like silver diamine fluoride.

- **Disinfection of the surface**

Human coronavirus may live up to 9 days at room temperature on an inert surface with a higher preference for humid situations. Clinical staff should also check to disinfect inert surfaces using chemicals confirmed against COVID-19 and keep a dry atmosphere to mitigate the 2019-nCoV spread. Such surface sanitizers include 62–71% ethanol, 0.5% hydrogen peroxide, and 0.1% (1 g/L) sodium hypochlorite. After each patient's visit, surfaces should be thoroughly wiped down, particularly around the operating sites.

- **Medical waste disposal**

The medical waste containing disposable protective equipment after use should be promptly delivered to

the temporary storage facility of the medical center. The reusable tools and materials should be cleaned, sterilized, and carefully preserved in compliance with the Protocol for the Disinfection and Sterilization of Dental Instrument. The medical and domestic waste produced by treating suspected or confirmed COVID-19 cases are considered to be infectious medical waste. Double-layer yellow clinical waste bags with a “gooseneck” knot should be used. The surface area of the waste bags should be labeled and disposed of in compliance with the requirements of medical waste disposal.²⁰

Prevention of Oral Diseases

General oral health prevention measures

In general, the prevention of oral health in children is based on the periodicity of the check-ups and oral hygiene education through adequate information of the parent on orodental diseases. In an epidemic context such as that from COVID-19, the difficulty of managing regular follow-ups of dental check-ups makes it essential to focus prevention on oral health education interventions that go through adequate remote information. For this purpose, it is possible to use “social” digital platforms on which the pediatric dentist can publish and disseminate behavioral guides for the protection of the oral health of children. The main goal of these guides would be to avoid, or at least minimize, the onset of unfavorable situations for the stomatognathic system, thus improving the oral health of the child.

Prevention of carious pathology

Prevention against the carious pathology must be based on adequate and effective home oral hygiene measures, on the use of dental floss in the tooth exchange phase associated with the completion of permanent dentition, and on correct alimentary behaviors that limit the intake of fermentable carbohydrates. It is important in this sense to inform parents about the carioprotective and cariogenic properties of specific foods²¹. A diet rich in fruit and vegetables not only protects from the onset of caries, thanks to mechanical protection associated with the stimulation of saliva but also helps to protect against the onset of gum diseases. Furthermore, during this epidemic period in which children are forced to spend most of their time at home, it is of fundamental importance to limit the consumption of soft and energy drinks since, in addition to containing high quantities of sugars, their acidic content produces dental erosion and makes the enamel tissue less resistant to the attack of

cariogenic bacteria.

Early Childhood Caries (ECC) affects the age group between 3 and 5 years and has a rapidly worsening clinical evolution with an easy onset of local abscess infectious complications associated with painful symptoms.²² The treatment of these complications requires emergency interventions and would therefore expose the child to potential risks of contagion from COVID-19. ECC prevention is therefore of fundamental importance and requires the interruption of incorrect alimentary habits such as the administration, especially during the night, of bottles filled with fermentable liquids containing carbohydrates, rather than pacifiers dipped in honey or sugar, erroneous expedients often adopted by parents to encourage the sleep of the child.

Other aspects of pediatric dental prevention

The need to spend the whole day in a home setting can stimulate more lively play modes in the children, with an increased risk of traumatic events affecting the dental elements and the consequent need for urgent interventions that increase the risk of contagion from COVID-19.

Parents should therefore be instructed on the need for careful supervision of the child’s activities, possibly recommending the use of protective mouthguards of the type usually indicated for contact sports.

In general, correct oral health must always be combined with a healthy lifestyle, thus

contributing to good general health. Therefore, physical activity at home, sleeping for an adequate number of hours, and proper nutrition and hydration throughout the day are strongly recommended.

Management

Management of orodental pathologies that do not represent an emergency

During the COVID-19 epidemic, together with all other medical activities, routine dental work in Italy was suspended and postponed in relation to the progress of the epidemic situation, with the recommendation of limiting dental interventions to emergencies only²³. Hence, the need to be able to follow the oral health status of children only through adequate remote interaction with parents, who must be properly trained on the recognition of diseases that do not require immediate intervention

and which can therefore be managed with palliative measures, waiting to be treated in an outpatient setting at the end of the epidemic emergency.

In agreement with the previous literature¹⁶, we list here several clinical situations that do not require emergency treatment and can therefore be remotely managed.

1. Deciduous or permanent teeth affected by previous carious lesions and treated with temporary dressings: in this case if the dressings were to de-cement from the prepared cavity, it is recommended to keep the cavity always free of food debris through careful removal with

mechanical brushing after meals to prevent the onset of painful symptoms. It is also recommended to avoid too hot or too cold foods that could trigger the onset of painful symptoms if the original treatment involved the removal of carious dentin-enamel tissue.

2. If the dressing concerns an endodontically treated deciduous or permanent tooth and the spontaneous removal of the dressing paste occurs, home treatment may involve washing the endodontic cavity with water diluted with hydrogen peroxide utilising a special syringe without a needle, followed by the application of a cotton pellet during the child's meals.

3. Chronic periapical periodontitis can occur with dental pain when chewing. For temporary control of symptoms, antibiotic therapy with amoxicillin or cephalosporin, and pain relievers such as ibuprofen are recommended, which are adjuvants to temporarily relieve symptoms and postpone dental treatment.

4. Delays of deciduous teeth exfoliation with their persistence in the arch, in conjunction with the simultaneous eruption of the corresponding permanent tooth are quite common occurrences. In this case, parents should be advised to encourage the child to chew hard consistency foods such as raw fruit and vegetables, which can stimulate the loss of the deciduous tooth by mechanically inducing its complete removal from the alveolar support.

5. Eruptive gingivitis of the permanent first molar is an additional clinical condition, which can be managed during this period. It manifests itself with swelling, edema, and redness of the gum in distal position to the erupting first permanent molar. This condition affects school-aged children, on average between 6

and 7 years. The advice to give to the parents is to use cleaning swabs that help the removal of food debris in the gingival bag between tooth and gum, by rinsing with anti-inflammatory mouthwashes alternating during the day with local chlorhexidine antiseptic sprays, to reduce the inflammatory state and the painful symptoms.

6. Malocclusions associated with crowding of the dental elements and with overjet and overbite alterations do not represent an emergency. Parents must be instructed to postpone the correction to the end of the epidemic. In case of increased overjet, a condition most frequently associated with the risk of fractures affecting the upper incisors, it is possible to recommend the use of standard mouthguards, easily available in the pharmacy.

Management of children undergoing orthodontic treatment

If the child is using a removable orthodontic appliance, the first indication to the parents is linked to the correct hand hygiene measures before inserting the device into the oral cavity. According to recent studies²⁴, the oral cavity has a high expression of the ACE2 receptor, considered the main host cell receptor for the SARS-CoV-2 virus. This fact also underlines the importance of correct hygiene associated with the management of orthodontic devices, which must be carefully sanitized before each use and stored in the appropriate box after use.

If Schwarz removable plates are used, a broken retention hook, such as the Adams hook that normally fits on the first permanent molar, is a not unusual occurrence. In this case, if the entire hook breaks from the resin section of the appliance, the child can continue to wear the device as long as the retention is preserved. Alternatively or in case of doubt, it is advisable to limit the use of the device during the daytime hours only, always under parental supervision, postponing the repair of the device at the end of the epidemic.

For fixed orthodontic devices cemented on the palatal arch, such as the rapid palatal expander, it is recommended to temporarily suspend the activations to avoid carrying out incongruous maneuvers that can facilitate the detachment of the device from the dental surfaces.

Given the current epidemic, it should be forcefully reiterated to the parents that the child must avoid eating viscous foods, such as caramel or chewing gum, or hard

foods that can favor the partial detachment of the device, thus triggering an emergency that requires immediate intervention by the pediatric orthodontist.

In the case of fixed multi-bracket therapy, the arch may slide and move distally to the

cemented tube on the molars. In this case, especially when light NiTi wires are in use, if the child reports a feeling of discomfort and puncture on the gum, it is possible to advise the parent to manually reposition the arch by sliding it towards the teeth most mesial to the molar using the fingertips of thumb and index. If a bracket de-cements from the dental surface and rotates by 180° to the tooth while remaining tied to the arch, the parent can reposition it manually, postponing the re-cementation to the end of the epidemic.

Management of orodental pathologies that represent an emergency

Many pediatric dental emergencies require immediate treatment even during the COVID-19 outbreak. Among these, we can list, e.g., acute pulpitis, acute apical periodontitis, dental trauma, and maxillofacial trauma^{32,33}.

The management of all pediatric dental emergencies during the epidemic must take place by adopting protective measures for healthcare personnel and the young patients as per the recommendations and guidelines related to the use of effective protocols for the prevention and control of infections referred to by the scientific literature [27-31].

Management of traumatic orodental injuries

Traumatic pathology has a prevalence that varies between 6.1% and 62.1% in individuals of preschool age³⁴ and between 5.3% and 21% of school age³⁵. It is therefore likely that it can present itself as an emergency to be managed during the COVID-19 epidemic. The condition associated with a favorable prognosis is represented by the immediate reimplantation of an avulsed permanent tooth. In this case, the success rate is associated with the conservation of the tooth in physiological solution or milk or saliva taking care to rinse it first with running water to decontaminate it before its introduction into the alveolus. In the case of a dislocation, the emergency treatment consists of repositioning and splinting with the adjacent dental elements. In general, the planning of the treatment of dental fractures, dislocation, or dental

avulsion depends on the age, the traumatic severity of the dental tissue, the development of the apex, and the duration of the dental avulsion^{32, 33}. If the patient presents with a contusion of the soft tissues of the face, debridement with the removal of torn and contaminated tissues, disinfection, and suturing is necessary. Patients with maxillofacial lesions require instead immediate hospitalization.

The recommendations provided by the Center for Disease Control and Prevention (CDC) or other local guidelines that may supersede these should be strictly followed when placing on and removing personal protective equipment used for treating children infected by COVID-19.³⁶

Conclusion

In the current context of epidemiological emergency linked to the COVID-19, it is necessary to re-evaluate the pediatric dentist's activities taking into account the challenges in terms of contagion containment. In this sense, the possibility of remote education of parents must be considered both as regards the general prevention measures for oral health, and as regards the home management of milder oral pathologies for which direct intervention of the specialist in pediatric dentistry is not necessary or can be postponed. On the other hand, if, in the presence of dental emergencies, immediate intervention is required, the observance of strict protection protocols of the subjects involved and environmental disinfection becomes crucial to minimize the risk of cross-infection.

The end of the pandemic will have to mark the beginning of new methods of approach and management in pediatric dentistry. The smart technological systems, that during the pandemic period blossomed to become the most powerful remote communication tool, could be of great help as standard projection tool for educational material on oral health in children, especially in school age, who are treated in outpatient clinics, boosting and strengthening the approach in pediatric dentistry and the children's motivation for oral health. On the other hand, the specialists in pediatric dentistry will have matured and strengthened their dedication to the practice of this medical specialty in the post-pandemic period, not only by improving and modernizing the approach techniques but also by proposing new models of treatment that may include the use of remote controls through special platforms, with practical guides dedicated to parents,

to monitor and preserve the great heritage of general health, of which oral health is an important component.

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