Changing perception of pediatric dental practice during global COVID-19 pandemic: The new normal

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Abstract

The COVID-19 pandemic has spread across the globe and is the greatest challenge faced by mankind today. The impact of the severe acute respiratory syndrome coronavirus (SARS CoV-2) pandemic has been unprecedented, especially in health care. Overwhelming amount of information flooded the literature to the point that dentists and specialists alike might feel more confused than knowledgeable, which can make decision-making a challenge. Pediatric dental community is no stranger to infection control and to treat patients with highly infectious diseases. With careful planning, modifications, and sound clinical judgment, it is certainly feasible to provide routine care to the patients during the pandemic and serve the community. It is of particular importance for pediatric dentist to take appropriate measures to minimize the risk of infection to their patients, themselves, and other members of the dental team. This review article discusses the risk of COVID-19 infection in children and healthcare workers, especially pediatric dentists, and preventive measures to be taken care of, to avoid the risk of spread of CoV-19 infection.

Keywords: Pediatric Dentist, COVID-19 pandemic, Global pandemic, SARS- CoV-2, Sanitization, Hand hygiene

Introduction

As human civilizations flourished, so did infectious disease. Large number of people living in close proximity to each other and animals, often malnourished with no or poor sanitation, provides breeding grounds for diseases. Globalization and the overseas trading routes is thought to be the main cause of the spread of novel infections far and wide, creating the global pandemics. A pandemic is an epidemic, which occurs on a huge scale and crossing international boundaries, affecting people globally.

The Novel Covid outbreak

The World Health Organization (WHO) announced that the COVID-19 outbreak had become a public health emergency of international concern on January 31, 2020 and then categorized it as a pandemic on March 11, 2020. The novel coronavirus disease (COVID-19) pandemic has emerged as a community health crisis and is spreading exponentially across the globe. The pattern of the community spread is alarming and has imprisoned the entire international society.

Mode of Transmission

The primary route of spread of COVID-19 is via respiratory droplets or through contact with an infected person. Air borne spread of Covid – 19 occurs when infected person cough or sneeze, whereas the fomites transmission could occur through touching contaminated inanimate objects or aerosolization transmission in a confined space. Viability of novel coronavirus have been reported to be up to 3 days on inanimate surfaces, at room temperature.1

Source of Transmission

Symptomatic patients are not the only source of coronavirus infection, recent studies have reported the contribution of asymptomatic patients and those in their incubation period are also...
the carrier of SARS–CoV-2 disease. SARS-CoV-2 has a mean incubation period of [5,6] days from exposure to onset of symptoms, ranging from 2 to 14 days [4].

Clinical Manifestations
Typical signs & symptoms of Covid-19 infection are fever and dry cough, while some experience headache, sore throat, fatigue, breathlessness, and other atypical symptoms such as muscle pain, confusion, diarrhea, and vomiting have also been reported, lately [5]. There are higher possibilities of increased number of undiagnosed cases undiagnosed cases, as most patients present very mild symptoms that closely resembles seasonal allergies and common flu.

Population at risk
In general, old aged people and medically compromised individuals with conditions like, diabetes, hypertension, cardiovascular/ respiratory distress or immunosuppression are at greater risk of infection [6].

Occupation at risk
Although, this pandemic has badly hit all the trade and businesses globally, still the frontline Covid-19 warriors are those engaged in delivering essential services, health facilities, sanitary workers and those involved in transportation. Health care workers are at the greatest risk, as they encounter diseases and infections daily and work in close proximity to one another and infected patients. Among all non-health care & health care occupation, dental professionals remained at greatest risk of exposing to coronavirus. Fig.1, shows that dentists are most often exposed to coronavirus, also they were the ones in the closest proximity to their patients.

Reported by New York Times, 15 March, 2020
- Guidelines for basic preventive measures to be taken at the workplace were issued in public interest by Ministry of Health & family welfare, Government of India. These include [7]
  - Mandatory use of face cover or mask
  - Social distancing at least 1 meter to be followed, all the time.
  - Practice frequent hand washing (for at least 40-60 seconds) even when hands are not visibly dirty and use of alcohol-based hand sanitizers (for at least 20 seconds).
  - Respiratory etiquettes to be strictly followed, for example - covering one’s mouth and nose while coughing/sneezing with a tissue/handkerchief/flexed elbow and disposing off used tissues properly.
  - Self-monitoring of health by all and reporting any illness at the earliest.
  - Mandatory use of Aarogya Setu mobile application by every individual.

Fig 1: Workers who face the greatest risk of coronavirus infection.

- a) Household made cloth mask: The CDC recommends wearing a cloth face covering (such as a homemade mask or scarf) when in public places where it’s difficult to maintain social distancing. However, home-made cotton masks are not effective against filtered SARS-CoV-2 during coughs by infected patients [8].

b) Surgical mask: According to the FDA, a surgical mask is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical masks did not exhibit adequate filter performance against aerosols measuring 0.9, 2.0, and 3.1 μm in diameter. Lee and colleagues showed that particles 0.04 to 0.2 μm can penetrate surgical masks [9].

c) N95 Respirators: The N95 respirator is the commonly used in industrial and health care environments. N95 respirators made by different companies were found to have different filtration efficiencies for the most penetrating particle size (0.1 to 0.3 micron) [10].

Covid – 19 Impact on Pediatric Dentistry
The dentistry is adversely affected by the advent of this global pandemic. With the rapid increase in the spread of the COVID-19, there has been an apprehension in the patients and parents of children for visiting the dental clinic for ongoing dental treatment or elective dental treatment. Thus, it is a challenge for dental professionals to deliver dental care to the patients effectively and efficiently amid COVID-19 pandemic. But what is more challenging in this time of crisis is, management and treatment of small children and those with special health care needs.
Pre-appointment mailing

Behaviour modification through pre-appointment mailing is not new in pediatric dentistry. In pre-Covid times, dentists used to obtain personal information from the parents about their child which includes, child’s nickname, likes dislikes, their favorite toy, favorite food, favorite activity & place. The COVID-19 has made behavior modification complicated as the dental surgeon’s personal protection equipment is an obstacle in establishing good doctor patient relationship, as far as the pediatric patients are concerned. Therefore, pre-appointment introduction of the child to the pediatric dental surgeon would be beneficial for both dentist and child. This can be done by sending a small introductory video of the dental operatory, dental personnel and dental surgeon wearing the PPE kit (Fig.2) through WhatsApp, so that child would become familiar with the environment in dental clinic, also it would be easier for pediatric dentist to instill a positive behavior in the child on dental chair, achieving patient cooperation, thus reducing dental anxiety and fear of closeness with the stranger.

Fig 2: Dentistry in Pre-Covid era and during Covid Pandemic

Tele dentistry to address the gaps

Covid – 19 pandemic has an alternative modality; one such is Tele-dentistry or teleconsultation. Tele dentistry has experienced a boom during this pandemic as it connected disadvantaged and homebound patients with the doctor to address lack of access during and after the pandemic. The American Academy of Pediatric Dentistry recommends, pre-screening of the health status of the child a day before the appointment via call, if at all parents report fever, cough or any other symptoms of common flu in child, appointment should be re-scheduled.

Standard precautions

It is important to realize that, even during pre-COVID-19, it was the part of routine practice for all dental professionals to obtain medical history, record vital signs and follow infection control protocol for every patient. Regardless of suspected or confirmed infectious disease, the standard precautions apply to all the patients. The Centre for disease control and prevention has recommended to postpone all elective medical & dental procedure until resolution of illness of the patient. However, while planning any invasive dental surgical procedure, patient should be tested for Covid – 19.

Dental appointment

Guidelines given by Ministry of Health and Family welfare, Government of India dated 19 May, 2020, stated that only emergency procedures should be allowed in the dental operatory and all the routine and elective dental procedures should be postponed. Centre for Disease control however stated that, emergency dental care to a confirmed/suspected COVID-19 patient if warranted medically, should be provided in a dental or hospital setup with adequate airborne precautions only (negative pressure and N95 mask). Underlying Table 1 outlines the most common acute dental conditions such as acute pulp and periapical diseases, acute periodontal disease and certain traumatic injuries and its management. Table 2 depicts recommendations for specific modifications to be adapted to deliver dental care to patients in different specialities of dentistry.
Table 1: Management of Acute Dental conditions during COVID-19 Pandemic

Table 2: Practice modifications for different dental specialties

Social Distancing in the waiting area
Barring a monumental breakthrough, social distancing is the new normal in the dental office. To minimize the number of patients in the waiting area, one patient – one room policy should be followed; the clinician shall ask the patient to report only via confirmed appointment on call, message, or email. Only one parent should be allowed to accompany the child patient in the waiting area. Space scheduled appointments for approximately, 30–40 minutes are necessary to maintain physical social distancing of at least 1 meter in the waiting area. Advisory (set of instructions) to be followed during dental appointment in the operatory and the waiting area, for the patients and parents/caregiver should be formulated and sent through WhatsApp along with the appointment reminder.
to ensure safety of the patients, parents and dental staff.

**Hand hygiene for patient, parent & dental auxiliary**

Proper hand hygiene is critical in disintegrating SARS-CoV-2, therefore patient & accompanying parent should be instructed to perform strict hand hygiene protocol with soap or 60-80% alcohol-based sanitizer or hand rub while entering the dental operatory and again after the dental procedure \[15\], as recommended by the Centre for Disease Control. Display posters or flyers in the dental operatory and waiting area, instructing patients, staff and accompanying parent (1) to perform hand hygiene and (2) to sneeze or cough into the elbow or tissue, and safely dispose the tissue immediately into the bin, preferably the one with the lid. Prior to treatment procedure, this hand hygiene should be performed by dental personnel assisting in the procedure, as recommended by “World Health Organisation’s (WHO) \[5\] Moments” \[16\] (Fig.3).

![Fig 3: “5 Moments” by WHO](image)

**Protection of oral health care personnel and patients during treatment**

1. **Personal Protection equipment (PPE)**

Personal protection equipment kit is essential so as to maintain a barrier while interacting with the patient or performing any dental procedure. Ensure that dental personnel are trained to use appropriate PPE, following risk assessment and standard precautions: impervious gown, eye protection, face mask, disposable cap, face shield and shoe cover (Fig.4) which should be donned before entering the dental operator.

![Fig 4: Personal protection equipment kit](image)

A common practice observed among dentists is removal of face mask while interacting with the patients, however this should be strictly avoided under any circumstances. The United States National Institute for Occupational safety & Health has classified particulate filtering respirator into three, namely: \[17\] Category N – not resistant to oil (N95, N99, N100). Category R- somewhat resistant to oil (R95, R99, R100) Category P – strongly resistant to oil (P95, P99, P100)

Table-3 depicts the recommendations for use of PPE kit for dental staff \[5\].

![Table 3: Recommended use of PPE kit for dental staff](image)

Dental personnel undertaking or assisting in the procedure must be well trained about proper use, and removal of PPE to prevent self-contamination \[14\].

2. **Pre procedural patient preparation**

Patient should be draped with single use or disposable plastic gown, preferably. Pre procedural use of 1% hydrogen peroxide or 0.1% povidone iodine mouth rinse can reduce
salivary bacterial load. Various studies have concluded the infectivity of chlorhexidine rinse against Covid – 19 virus.

3. Radiographs
During diagnosis, radiological investigations should be performed with extreme care. Since intra oral radiographs stimulate saliva and coughing, extra oral radiographs should be carried out, such as panoramic radiographs, cone beam computed topography [20].

4. Rubber Dam isolation
During dental procedures, dental dam (Fig.5) isolation is an ideal and effective method that provides barrier protection from primary source and virtually eliminate all pathogens emerging from respiratory secretion. However, it is also effective in reduction of aerosol production and particle spread, hence should be utilized for any procedure wherever feasible. Application of rubber dam during cavity preparation showed a significant reduction in the spread of microorganisms by 90% [22].

Aerosol generating procedures in dental setting – Risk & prevention
Certain dental procedures like, oral prophylaxis, restoration or crowns preparations are performed using high-speed handpiece which require water coolant in order to dissipate heat produced by the handpiece to avoid damage to the dental tissues and pathological changes in the dental pulp. However, this water coolant generates aerosol (Fig.6). Bioaerosol are created when aerosols are combined with fluids of the oral cavity like blood or saliva. These aerosols are contaminated by various microorganisms and have the potential to remain suspended in the air for considerable amount of time and are inhaled by dentist and patients [23].

(b) Ultrasonic scaler (c) air-water syringe
Therefore, it is mandatory to use high volume suction and good ventilation in the operatory. The American Dental Association, recommends use of high-volume evacuation suction, capable of removing up to 100 cubic feet of air per minute as they are effective in removal of droplets at the site in the oral cavity and reducing aerosolization in operatory in an effort to reduce viral spread [24]. Also, the use of pre-procedural mouth rinse using chlorhexidine mouthwash or betadine mouthwash should be taken into consideration. However, to prevent coronavirus transmission in the dental set up, aerosol generating procedure should be replaced by minimally invasive dentistry procedures. Under any unavoidable circumstances, four handed dentistry [10] should be preferred using all the hand hygiene protocols and personal protection equipment kit by the dentist as well as assistant.

Drill free dentistry – a boon for dentistry in Covid -19 era
Advances in materials, instrumentation and techniques have shift the paradigm towards minimally invasive dental procedures. The minimally invasive dentistry was pioneered in early 1970s with the focus on prevention, remineralization of dental caries and minimizing dental interventions. Lesser we did know; this drill-free dental approach will appear as a blessing in disguise in oral health care during this time of Covid -19 pandemic. Various minimally invasive dentistry procedures, instrumentation techniques and materials enlisted below can aid in delivering dental care to children amid Covid -19 pandemic.

- Non instrumental endodontics or Lesion Sterilization & Tissue Repair (LSTR) [25] - The lesion sterilization and tissue repair (LSTR) technique was developed by the Cariology Research Unit of Niigata University School of Dentistry, Japan. This technique uses a combination of antibiotics at the exposure site to sterilize the endodontic lesion. Since excessive instrumentation of root canals leads to inadvertent removal of tooth structure, this Non-Instrumental Endodontic Technique or LSTR leads to preservation of tooth structure. The LSTR therapy aims to eliminate causative bacteria from lesions, and after sterilization, the lesions are repaired or regenerated by the host’s natural tissue recovery process and is simple, painless, time-saving, and lessens physical and mental burden for patients.

- Remineralising agents – There are diverse number of remineralizing agents available which can be prescribed to children with caries risk. These include, fluoride preparations, non-fluoridated agents like amorphous calcium phosphate, CPP-ACP, xylitol, Enamelon, Novamin etc. These agents are available in the form of mints, gums, chewable tablets and in the form of pastes or creams (Fig.7), they possess anti cariogenic properties, hence, enhancing re-mineralization of initial caries lesion [27].

- Silver Diamine Fluoride – It is a safe and effective non-restorative treatment option available, that aids in caries
arrest (Fig.8) and eliminating reversible pulpitis pain. It is also known as “silver bullet” or “magic bullet”, it has anti-bacterial, anti-hypersensitivity properties.

Fig 8: SDF treated teeth

- **Resin infiltration** – Caries infiltration is a novel technique that bridges a gap between prevention and restoration through filling [29] the cavitated defect. Infiltration technique is a single visit procedure that eliminates the need of local anesthesia and cavity preparation.

- **Chemo-mechanical cavity preparation** – It is an alternative caries removal method, which makes use of chemical removal of infected dentine [29]. The tooth is treated using hand excavation and application of gel. Carisolv and apacarie are among few commercially available chemo mechanical cavity preparation agents (Fig.9) The technique requires no use of local anesthesia and hand piece.

Fig 9: Chemo-mechanical caries removal

- **Atraumatic restoration technique** – It works on two principles, one is, excavation of caries using hand instruments only i.e spoon excavator and; secondly, restoration of cavity using material that stick to the cavity such as Glass ionomer cement.

- **Halls technique** – Halls technique is recommended for primary molars especially with class carious lesion. After, infected caries removal through spoon excavator the cavity is sealed using glass ionomer cement and covered restored using preformed, pre crimped & pre contoured stainless steel crowns. Various studies have concluded high success rate of restoration of occluso-proximal lesions in primary molars using halls technique, in comparison to conventional restorative materials [30].

- **Use of lasers** - Based on development in adhesive dentistry and the propagation of minimum intervention principles, lasers may revolutionize cavity design and preparation. 3 wavelengths are available for clinical use in hard dental tissue management. These include, (1) Erbium:yttrium-aluminum-garnet Er: YAG (λ =2.94μm) (2) Erbium- chromium:yttrium-scandium - gadolinium-garnet Er:Cr: YSGG, (λ = 1.1μm). (3) Er:YSGG (λ =2.79μm). Lasers are found to be effective in cavity preparation, caries removal, restoration removal, etching and treatment of dentinal sensitivity, caries prevention and bleaching [31].

**Disinfection of the clinic setting in between patients**

In accordance with standardised operating procedure, one cycle of cleaning and disinfection should be carried out in the treatment area, after every patient to eliminate the risk of Covid-19 infection transmission.

- High touch surfaces such as doors, railings, grills, handles, reception desk, phone should be thoroughly scrubbed with a detergent in order to remove organic matter before disinfection.

- All patient-care items (dental instruments, devices, and equipment) must be sterilized after every use.

- Staff performing cleaning and disinfection should wear appropriate PPE.

- Many disinfectants are active against viruses like COVID-19, hence World Health Organisation recommends the use of [14]

- 70% ethyl alcohol for disinfecting small surface areas and equipment in between uses. For example, dental chair, patient hand rest, dental chair light etc.

- 0.1% sodium hypochlorite is an effective disinfectant for inanimate objects and surface, whereas 0.5% sodium hypochlorite can be used for disinfecting large blood or bodily fluids spills.

- “No touch surface disinfection” technique is beneficial for sanitization and disinfection of dental clinic in between each patient. This fogging5 procedure makes use of 20% w/v hydrogen peroxide solution (stabilized by 0.1% silver nitrate).

**Waste management** [8]

The infectious medical waste of suspected or confirmed COVID-19 individual should be disposed of in double-layered yellow-coloured bags with gooseneck ligation. The bags should be marked and disposed of in accordance with the Biomedical Waste Management and Handling Rules, 2018.

**Conclusion**

In the current scenario of epidemiological emergency due to COVID-19, it is necessary to re-evaluate the activities of pediatric dental surgeon, considering the challenges in terms of contagion containment.

- In case of dental emergencies, immediate intervention is required, with the observance of strict environmental infection control and personal protection protocols of the subjects involved, becomes crucial to minimize the risk of cross infection or transmission.

- In future, the end of this Covid-19 pandemic shall mark the beginning of new procedures and management of pediatric dental patient.

- The smart technological systems or techniques such as tele-dentistry or video consultation, that boomed during this time of pandemic, may become the most powerful remote communication tool, mode of education for oral health awareness in children, especially in school age, who are treated in outpatient clinics, hence, boosting and strengthening the approach in pediatric dentistry and the children’s motivation for oral health care.
References
1. An Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN et al. Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1. N Engl J Med 2020;382:1564-67.
2. Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. Lancet 2020;395:513-24.
3. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. N Engl J Med 2020;382:970-1.
4. Klinkenberg A, Wallinga DJ. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January. Euro Surveill 2020;25:200062.
5. Al-Halabi M, Salami A, Alnuaimi E, Kowash M, Hussein I. Assessment of paediatric dental guidelines and caries management alternatives in the post COVID-19 period. A critical review and clinical recommendations. European Archives of Paediatric Dentistry. 2020;16:1-4.
6. Preskorn SH. The 5% of the Population at High Risk for Severe COVID-19 Infection Is Identifiable and Needs to Be Taken Into Account When Reopening the Economy. Journal of Psychiatric Practice®, 2020;26(3):219-27.
7. Guidelines on preventive measures to contain spread of COVID-19 in workplace settings. MOHFW, India 2020.
8. Bae S, Kim MC, Kim JY, Cha HH, Lim JS et al. Effectiveness of surgical and cotton masks in blocking SARS-CoV-2: a controlled comparison in 4 patients. Annals of Internal Medicine 2020.
9. Oberg T, Brosseau LM. Surgical mask filter and fit performance. Am J Infect Control 2008;36:276-282.
10. Lee SA, Grinshpun SA, Reponen T. Respiratory performance offered by N95 respirators and surgical masks: human subject evaluation with NaCl aerosol representing bacterial and viral particle size range. Ann Occup Hyg 2008;52:177-185.
11. Qian Y, Willeke K, Grinshpun SA, Donnelly J, Coffey CC. Performance of N95 respirators: filtration efficiency for airborne microbial and inert particles. American Industrial Hygiene Association Journal. 1998;59(2):128-32.
12. Brian Z. Oral Health and COVID-19: Increasing the Need for Prevention and Access. Preventing chronic disease 2020, 17.
13. Grant M, Strong B, Schramm A, Buchbinder D, Willis E, Sanchez G, et al. AO CMF International Task Force Recommendations on Best Practices for Maxillofacial Procedures During COVID-19 Pandemic.
14. World Health Organization. Considerations for the provision of essential oral health services in the context of COVID-19: Interim guidance 2020.
15. Infection Prevention and Control Guidelines and Recommendations. Last accessed on: https://www.cdc.gov/oralhealth/infectioncontrol/guidelines
16. World Health Organization. Your 5 Movements for Hand Hygiene Dental Care. https://www.who.int/gpsc/5may/dental-care.pdf?ua=1. Published 2012. Accessed 18 May, 2020.
17. Lee S, Hwang D, Li H, Tsai C, Chen C, Chen J. Particle size-selective assessment of protection of European standard FFP respirators and surgical masks against particles-tested with human subjects. J Healthc Eng. 2016;2016:8572493.
18. Kariwa H, Fujii N, Takashima I. Inactivation of SARS coronavirus by means of povidone-iodine, physical conditions, and chemical reagents. Jpn J Vet Res 2004;52:105-12.
19. Peng X, Xu X, Li Y, Chen L, Zhou X, Ren B, et al. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci 2020;12:9.
20. Li R, Leung K, Sun F, Samaranayake LP. Severe acute respiratory syndrome (SARS) and the GDP. Part II: Implications for GDPs. Br Dent J. 2004;197:130-4.
21. Samaranayake LP, Reid J, Evans D. The efficacy of rubber dam isolation in reducing atmospheric bacterial contamination. ASDC J Dent Child. 1989;56:442-4.
22. Cochran MA, Miller CH, Sheldrake MA. The efficacy of the rubber dam as a barrier to the spread of microorganisms during dental treatment. J Am Dent Assoc 1989;119(1):141-144.
23. Jones RM, Brosseau LM. Aerosol transmission of infectious disease. J Occup Environ Med. 2015;57(5):501-508.
24. Summary of ADA Guidance during Covid 19 Crisis 2020. Last accessed on: https://www.success.ada.org/~/media/cps/files/covid/covidx-19_int_guidance_summary.pdf?utm_source=cpsorg&utmsource=cpsorg&utm_medium=cpsalertbar&utmcontent=cv-pm-summary-guidance&utmcampaign=COVID-19.
25. Dimri A, Srivastava N, Rana V, Kaushik N. Minimally invasive endodontics: A Review: Int J App Dent Sc 2021;7(2):33-35.
26. Agarwal M, Das UM, Vishwanath D. A comparative evaluation of noninstrumentation endodontic techniques with conventional ZOE pulpectomy in deciduous molars: an in vivo study. World J Dent 2011;2(3):187-92.
27. Arife MK, Ephraim R, et al. Recent Advances in Dental Tissue Remineralization: A Review of Literature. Int J Clin Pediatr Dent 2019;12(2):139-144.
28. Gugnani N, Pandit IK, Gupta M, Joshan R. Caries infiltration of noncavitated white spot lesions: A novel approach for immediate esthetic improvement. Comtemp Clin Dent 2012;3:$199-202.
29. Boley JA, Yip HK, Stevenson AG. Chemochemical caries removal: a review of the techniques and latest developments. British Dental Journal 2000;188(8):427-30.
30. Araujo MP, Innes NP, Bonifácio CC, Hesse D, Olegário IC, Mendes FM et al. Atraumatic Restorative Treatment compared to the Hall Technique foroccluso-proximal cavities in primary molars: study protocol for a randomized controlled trial. Trials 2016;17:169.
31. Bader C, Krejci I. Indications and limitations of Er: YAG laser applications in dentistry. American Journal of Dentistry 2006;19(3):178-86.