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Review Article

TELE-ORTHODONTICS: A DIGITAL SOLUTION DURING COVID 19 PANDEMIC

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ABSTRACT

Over the past one year, the planet witnessed historic associated dramatic developments concerning the speedy emergence of a unique coronavirus. Entire countries are beneath imprisonment in an exceedingly bid to limit the spread of the virus. Digital health fares as an adequate answer in these circumstances. As corporations and even faculties adopt the work-from-home solution, remote consultation is additionally turning into a progressively enticed choice in healthcare. WHO is advocating for telemedicine to monitor patients and cut back risks of them spreading the virus by traveling to hospitals. The COVID-19 pandemic brought telemedicine into a replacement light. As health workers have to be compelled to keep healthy and disease-free, the necessity for remote technologies skyrocketed. Coronavirus also can be transmitted through the saliva, and the fetal–oral routes may also be a possible person-to-person transmission route. The chance of infection is high between patients and dental practitioners, due to the characteristics of dental settings. Now is the time for dental health professionals to hitch our medical colleagues, and public health officers in containing the COVID-19 pandemic. With straightforward tools like smartphones and portable computer webcams, dentists can see the foremost vulnerable dental patients safely in their homes, thereby eliminating their risk of infection. Orthodontists can use other ways to observe patient treatment progress or to advise in an emergency by exploitation apps like Dental Monitoring that is designed to trace patient treatment remotely.

INTRODUCTION

What is covid 19?

COVID-19 is an infectious disorder caused due to intense acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] The disease became first diagnosed in 2019 in Wuhan, the capital of China's Hubei province, and has since spread globally, ensuing with inside the ongoing 2019–20 coronavirus pandemic.[2,3] Common signs and symptoms consist of fever, cough, and shortness of breath.[4] Other signs and symptoms may also consist of muscle pain, sputum production, diarrhoea, sore throat, loss of smell, and stomach pain.[5,6] While the majority of instances bring about mild signs and symptoms, few of them progress to pneumonia and multi-organ failure.[2,7] The virus is specifically spread during near contact and through respiratory droplets produced while human beings cough or sneeze.[8,9] Respiratory droplets can be produced throughout breathing however, the virus is not commonly airborne.[8,10] People may contact COVID-19 through touching an infected surface after which their face.[8,9] It is most contagious while human beings are symptomatic, even though spread can be viable earlier than signs, and symptoms appear.[10] The virus can live on surfaces for as much as seventy-two hours.[11]

Time from exposure to onset of signs and symptoms is generally among and fourteen days, with an average of 5 days.[4,12] The standard method of diagnosis is through reverse transcription-polymerase chain reaction (RT-PCR) from a nasopharyngeal swab.[13] The infection also can be identified from a combination of signs and symptoms, risk factors, and a chest CT scan showing features of pneumonia.[14,15] Recommended measures to prevent contamination consist of frequent hand washing, social distancing (keeping a bodily distance from others, especially from people with signs and symptoms), overlaying coughs and sneezes with a tissue or inner elbow, and maintaining unwashed hands away from the face.[16,17] The use of masks is usually recommended by a few national fitness authorities for people who suspect they have the virus and their caregivers. However, now no longer for the overall public, although, simple cloth masks can be utilized by individuals who desire them. [18, 19] Although many vaccines have been made available in the recent past but because of various mutants of SARS-CoV-2, we are still not sure of total protection against the virus. Even after vaccination also no particular antiviral drug therapy is available for COVID-19. Management includes the treatment of signs and symptoms,

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supportive care, isolation, and experimental measures. [20] The World Health Organization (WHO) declared the 2019–20 coronavirus outbreak a Public Health Emergency of International Concern (PHEIC) on 30 January 2020.[21,22] and a pandemic on 11 March 2020.[3] Local transmission of the disease has been recorded in many nations throughout all six WHO regions.[2]

POSSIBLE TRANSMISSION ROUTES OF 2019-NCOV IN DENTAL CLINICS

Dental care settings always carry the danger of 2019-nCoV infection because of the specificity of its procedures, which includes a face-to-face conversation with patients, and frequent exposure to saliva, blood, different body fluids, and the handling of sharp devices.

Airborne spread: droplet and aerosol transmission of 2019-nCoV are the most critical concerns in dental clinics and hospitals, due to the fact it's far difficult to keep away from the generation of huge amounts of aerosol and droplet combined with the affected person's saliva or even blood during dental practice.[24] In addition to the infected patient's cough and breathing, dental devices consisting of high-velocity dental handpiece makes use of excessive-velocity fuel line to force the turbine to rotate at excessive speed and work with running water. When dental devices work withinside the affected person's oral cavity, a huge amount of aerosol and droplets combined with the affected person's saliva or even blood can be generated. Particles of droplets and aerosols are small sufficient to stay airborne for a prolonged period before they settle on environmental surfaces or enter the breathing tract.

Contact spread: A dental professional's common direct or indirect contact with human fluids, patient materials, and infected dental devices or environmental surfaces makes a probable path to the spread of viruses. [24] Besides, dental specialists and different patients have probably contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing microorganisms generated from an infected person and propelled a short distance through coughing and talking without a mask.

Contaminated surfaces spread: An endemic human coronaviruses (HCoV) can persist on surfaces like metal, glass, or plastic for as much as more than one day. [25]

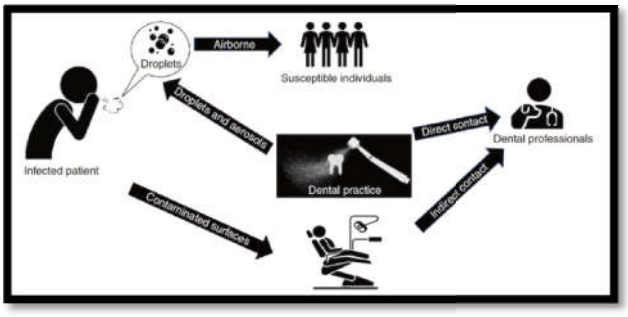

Fig 1 Possible transmission routes of 2019-ncov in dental clinics

Therefore, infected surfaces which can be frequently contacted in healthcare settings are a potential source of coronavirus transmission. Dental practices derived from droplets and aerosols from infected patients, which contaminate the whole surface in dental clinics. Also, it became shown at room temperature that HCoV remains infectious from 2 hours much as nine days, and persists better at 50% in comparison with 30% relative humidity. Thus, maintaining clean and dry surroundings withinside the dental workplace might help decrease the persistence of 2019- nCoV.

INFECTION CONTROLS FOR ORTHODONTIC PRACTICE

The CDC has launched its Interim Infection Prevention and Control Recommendation for healthcare practitioners managing COVID-19.

Clinical guidelines during covid19, for the orthodontic practice:

Telescreening and triaging: Initial screening through telephone or smartphone to identify patients with suspected or possible COVID -19 contamination may be carried out remotely on the time of scheduling appointments for orthodontic treatment. The three most important questions for preliminary screening have to encompass any exposure to a person with the recognized or suspected COVID-19 presentation, any current travel history to a place with high with the excessive prevalence of COVID 19, or the presence of any signs and symptoms of febrile respiratory infection including fever or cough. Ions have to increase preliminary concern, and elective dental care has to be deferred for as a minimum of 2 weeks (Note: As stated previously, the incubation duration for SARS-CoV-2 can range from 0–24 days). These patients must be encouraged to have interaction in self-quarantine and contact their primary care health practitioner by smartphone or email.

Minimize chance for exposures: When patients do arrive for an appointment, the reception team of workers has to be screening patients and family members. Children who arrive for an appointment might be probably well, however, the accompanying sibling won't be. Disposable thermometers are available on the front table, with a trash can available at the affected person's side of the desk for disposal. Besides, hand sanitizer and tissues have to be available. Consider providing patients care packs with those items, in addition to different patient comfort items, including wax and/or Ortho Dots from Or Vance.

Adhere to standard, contact, and airborne precautions, and including the use of eye protection

1. This is an airborne virus. Proper hand hygiene is important for a team of workers, as are proper PPE (Personal Protective Equipment) standards. The CDC recommends staff use healthcare grade alcohol-based hand sanitizer earlier than and in the end patient contact, contact with probably infectious material, and earlier than placing on or putting off PPE, which includes gloves.
2. Advises team of workers to remember buttoned clinic jackets rather than scrub tops that have to be pulled over the head, bringing the soiled garment in contact with the eyes, nose, and mouth.
3. In the orthodontic workplace, bracket-associated treatment is much more likely to generate body fluid exposure and aerosols than aligner treatment. When aerosol-producing procedures are carried out, proper respiratory safety is needed including a 3 layer masks or N-95 respirator and the variety of staff taking part in the procedure should be restrained to essential personnel.

Manage visitor access: At this time, the front workplace team restricts access to clinical areas. That way mother and father and/or siblings must wait withinside the reception room. Again, patients showing signs and symptoms or who have a fever over 100 degrees must delay any appointments. If feasible, use alternative methods to monitor patient treatment progress or to advise in an emergency. Orthodontists additionally want to maintain in mind that some of their patients can be at higher threat for COVID-19, particularly the ones sufferers with underlying illnesses, including immunocompromised patients, transplant recipients, or people with coronary heart or lung conditions. Evaluate the risk to the health of every patient entering the practice and take precautions to limit their threat.

Implementing engineering controls: The fact is most orthodontic workplaces characteristic an open bay, restricting the feasibility of physical barriers or partitions to split patients. Again, this is where it's far essential to isolate, as much as feasible, patients who show signs and symptoms or who're actively infectious once they want to be available in for an emergency appointment. Use the personal room in the clinic for those patients to limit their exposure to others in the clinic area. Also, do now no longer use fans-that is an airborne virus in the end; and, in which possible, use barriers on touch screens.

Train and educate healthcare personnel: Both clinics and the front table team of workers want to know what COVID-19 is? Give them the facts. Go over proper hand hygiene and proper use of PPE-both placing it on and disposing of it. Discuss how the workplace is handling patients who show signs and symptoms or who have the virus. Make positive all staff have access to hand sanitizer, tissues, and, while necessary, face masks.

Implement environmental infection control: Front workplace team of workers wants to make certain that they are disinfecting public area frequently-that consists of door handles, countertops, and all contact surfaces. Follow manufacturer's cleansing commands is going for all device withinside the orthodontic workplace-from handpieces to intraoral scanners to chairs and lighting. Each piece of the device may have its disinfecting technique. The CDC recommends merchandise with EPA-accepted rising viral pathogens claims to be used in opposition to COVID-19.

TELE-CONSULTATION: AN ALTERNATIVE WAY OF INFECTION CONTROL

Amidst the rising panic regarding COVID-19 across India, technology is being leveraged extensively to identify and eliminate potential transmitters. Those suffering from cold, cough, and fever are taking to teleconsultations to gauge if they need to pay an in-person visit to the hospital for getting tested for coronavirus. Telemedicine has made it possible for those who are isolated due to the coronavirus to be able to access medical services from home by audio or video, an important step to protect other patients and healthcare workers from being infected. Additionally, with the availability of teleconsultation, people will be prevented from self-medication, which leads to other complications. Online doctor consultation platforms are witnessing a surge in the number of consultations as more people dial them to check if their symptoms are related to the novel coronavirus.

Tele-Health

During this worldwide pandemic, teleconsultation is increasing as a powerful and sustainable solution for precaution, prevention, and treatment to control the spread of COVID-19. Virtual consultation is bridging the distance among humans, physicians, and health systems, allowing everyone, especially symptomatic patients, to stay at home and communicate with doctors via digital channels, helping to reduce the spread of the virus to mass populations and the clinical team of workers at the frontlines. Many chronic patients can from home have scheduled teleconsultations to keep away from face-to-face hospital visits and therefore reduce their dangers of exposure to COVID-19. By the use of their phone or computer, patients can be capable of getting guidance about whether or not they need to be seen or tested rather than showing up unannounced in the emergency room or doctor's office. Patients, especially people who might be at excessive risk for severe illness if they have been infected, also can refer to alternative a trip to a doctor's office with a digital visit while it's far a routine check-in with an expert or a primary care doctor. That way they could avoid crowded waiting rooms and potential infection.

Tele-orthodontics

For patient and employee protection in dentistry, one of the foremost goals is to break the chain of infection transmission. Nevertheless, infection risks in orthodontic practice are instead hard to manage. [25,26,27] Traditional techniques required disinfecting items such as impression, chewing waxes, and orthodontic appliances with well-suitable products, which are also chosen for restricting changes in impressions of patients or orthodontic appliance deterioration. Effective techniques are available with difficulties. Some of those include irritant or non-eco-friendly disinfectants. The transport of impressions of patients, to dental laboratories, is usually delayed with limited precautions for reducing cross-infection. Gypsum casts of patients are frequently contaminated especially through microorganism and their antibiotic-resistant traces or even stored for long durations during dental implant-supported restoration and orthodontic treatment, turning into a hidden source of infection. These days, computer-aided design/ computer-aided manufacturing technology appears to be an exciting way to promote both commercial enterprise and protection, being extra comfortable for dental patients and more accurate than traditional technology. A similar benefit is easier infection prevention since, for the maximum part, especially virtual impression and casts are not a source of cross-infection and the transport of contaminated objects is decreased and restricted to try-in stages. The need to respect safety distance and the fears patients have about the danger of infection make Tele-orthodontics an essential tool for the duration of a virulent disease lockdown and in its instantaneously post-emergency phase. Tele-orthodontics demonstrated to be a feasible tool to keep at least a few orthodontic care in times of emergency, however, it can be taken into consideration the best answer and addition even in regular times to ease therapy demands for both the orthodontist and the patient, even as reducing time and money spent, without an excessive decrease in orthodontic quality.

Remote monitoring

Digital tools including remote dental monitoring should play a key role in containing the outbreak of COVID-19 and assist

individuals who think they have got been exposed to the novel coronavirus. Remote patient monitoring has been shown to decrease unnecessary hospitalizations, enhance disease management ability, and enhance the quality of life via way of means of enabling rapid identification and treatment of disease exacerbation (American Telemedicine Association, 2006).

Dental Remote Monitoring is simpler and greater immediate solutions to evaluate, monitor treatment, and communicate together along with your patients as much as needed. The goal of this new patient-focused service is to reduce the frequency of dental clinic visits, give orthodontists even more data on treatment progress, and decrease total treatment time. By monitoring, managing, and engaging people with known/suspected SARS-CoV-2 infection at home you may keep more patients out of the dental clinics. Move low-acuity patients out of the hospital, or those who are at high-risk from infection e.g. immunocompromised, safely home. Orthodontists can use alternative approaches to monitor patient treatment progress or to advocate in an emergency by the use of mobile apps like Dental Monitoring, Photo Monitoring Light and SmileMate Virtual Consultation which are designed to track patient treatment remotely. Dental Monitoring (DM): At the forefront of this technology is Dental Monitoring (DM), a software system that facilitates an orthodontist to maintain control over treatment progress from the first consultation to the retention period. The DM app is prescribed through an orthodontist for patients who are in, or about to start orthodontic treatment. They can download the DM app from the App Store or Google Play. To remotely monitor a patient's treatment, the orthodontic practice needs to installation a Dental Monitoring account earlier than the patient app can be activated. Once your online dashboard is installed, you log-in to check your patients' treatment progress.

Fig 2 Remote Treatment Monitoring

This includes

1. Sequential patient photos from different shots,
2. Notifications of what's detected by DM's proprietary A.I. system.

Fig 3 Dental monitoring consists of three integrated platforms: a mobile application for the patient, a patented movement tracking algorithm, and a web-based doctor dashboard

DM's clinical team of dental professionals ensures that every result is tested for quality assurance and accuracy. Automated patient communications sent via the DM app. Each practice creates its internal DM protocols with the assist of Dental Monitoring Product Specialists. Dental Monitoring suggests the orthodontist appoints team members to be trained on the way to use the DM dashboard. Each practice can then determine how remote information (notifications) is processed. Important clinical matters are generally addressed by the orthodontist while others are reviewed by the clinical team member. Each notification is color-coded primarily based totally upon your particular priority. All patient records are stored on secure web-servers which have been approved for health data storage. Your protocols send the right instruction to the right people at the right time, so that you can take away repetitive instructions and solve issues before they become problems. Dental Monitoring introduced 11 months ago, the launch of a simplified version of SmileMate Virtual Consultation - its teledentistryway to allow dental professionals to evaluate their new patient inquiries remotely and in a HIPAA compliant manner. Given the scale of the pandemic, and the increasing containment measures are taken with the aid of using governments worldwide, teledentistry inclusive of SmileMate Virtual Consultation has emerged as a solution to help assess patients remotely in those unprecedented times - starting up the first consultation from home and preventing the spread of COVID-19.

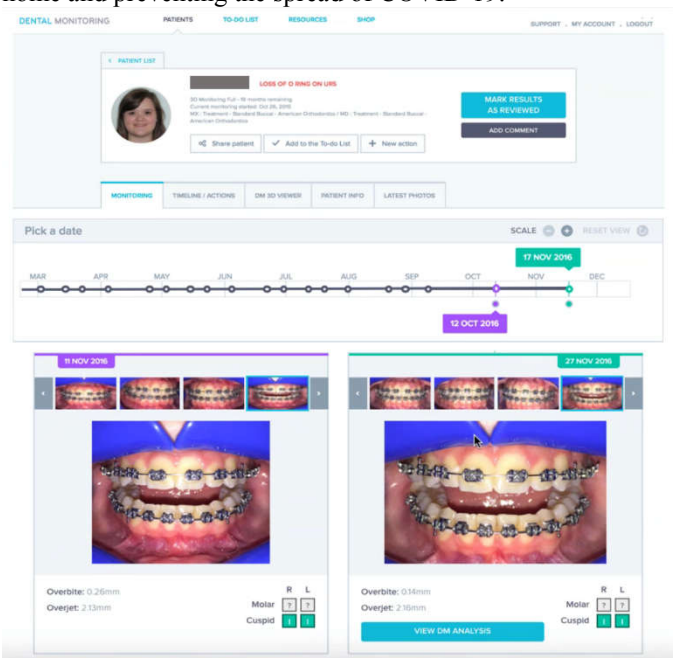

Fig 4 Patient sheet with activity curve, photo gallery, detailed curves per tooth

CONCLUSION

In this point-of-view article, we discuss the ability of transmission through the saliva of this virus. The COVID-19 transmission through contact with droplets and aerosols generated throughout dental clinical processes is expected. There is a need to boom investigations to the detection of COVID-19 in oral fluids and its effect on the transmission of this virus, which is critical to enhancing effective techniques for prevention, especially for dentists and healthcare specialists that carry out aerosol-generating procedures. In each day practice, teleconsultation is one of the most important innovations that help infection prevention in comparison to conventional technology because it breaks or reduces cross-

infection in the dental clinic. In all of the emergency phases, Tele-orthodontics is essential not only for the possibility to continue the orthodontic therapies, but also, from a psychological standpoint, to reassure the patients and his/her dad and mom about the improvement in their smile Dentistry appears to be in the first line of prevention and need to begin to equip itself with skills, updated information for taking care of the different needs, and demands and aspirations of typically aged and infected patients, consisting of innovation through virtual dentistry. It is essential to respect patients' rights in phrases of privacy and massive data protection.

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