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MANAGING THE PANDEMIC: COVID- 19, PRECAUTIONS AND PROTECTIONS IN DENTAL PRACTICE

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Abstract:

The recent spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its associated Coronavirus disease (COVID-19), has gripped the entire world and has caused public health concerns throughout the world. Despite global efforts to restrain the disease spread, the outbreak is still on the rise owing to community spread pattern of this infection.

Dental professionals, including prosthodontists, may soon encounter patients with suspected or confirmed SARS-CoV-2 infection and will have to act diligently not only to provide care but at the same time prevent nosocomial spread of infection.

Key words: infection, transmission, aerosol, practice management

Introduction:

The novel coronavirus belongs to a family of single-stranded RNA viruses known as Coronaviridae[1]. This family of viruses are known to be zoonotic or transmitted from animals to humans. These include severe acute respiratory syndrome coronavirus (SARS-CoV), first identified in 2002 and the Middle East respiratory syndrome coronavirus (MERS-CoV), first identified in 2012[2].

The outbreak of coronavirus disease 2019 (COVID-19) in the area of Wuhan, China has evolved rapidly into a public health crisis and has spread exponentially to other parts of the world. There is strong evidence that this novel coronavirus has similarity to coronavirus species found in bats and potentially pangolins, confirming the zoonotic nature of this new cross- species viral-mediated disease[3,4]

On January 30, 2020, the World Health Organization (WHO) declared the rampant spread of SARS-CoV-2 and its associated disease (COVID-19) a public health emergency with a currently known overall mortality rate to be as high as 3.4%[5]. According to WHO Covid-19 update (April 13, 2020) more than 1.7 million people have been infected and almost 80000 people have lost their lives. Therefore, measures for prevention, rapid identification and management must be in done for appropriate reduction of further spread.

Given the widespread transmission of SARS-CoV-2 and reports of its spread to Health Care Providers (HCPs)[2], dental professionals are at high risk for nosocomial infection and can become potential carriers of the disease because of unique nature

(contact with oral, nasal, and eye mucous membranes)and indirect contact with the surfaces in the immediate environment or with objects used on infected person (eg: stethoscope or thermometer)

Although common clinical manifestations of novel coronavirus infection do not include eye symptoms, the analysis of conjunctival samples from confirmed and suspected cases of 2019- nCoV suggests that the transmission of 2019-nCoV is not limited to the respiratory tract , and that eye exposure may provide an effective way for the virus to enter the body[4].

Although SARS-CoV-2 is known to be highly transmissible when patients are most symptomatic, but since the incubation period can range from 0-24 days transmission can occur before any symptoms appear[6]. Notably, a report of one case of 2019-nCoV infection in Germany indicates that transmission of the virus may also occur through contact with asymptomatic patients[7].

Symptoms

Signs and symptoms of covid-19 may appear 2 to 14 days after exposure and can include fever, cough and shortness of breath. Other symptoms include tiredness, aches, running nose and sore throat. Some also experience loss of smell and taste. In addition, abnormal chest X-Ray and computer tomography (CT) findings such as ground-glass opacities are typically found in the chest[6]. Majority of patients have only mild flu-like symptoms and seasonal allergies, which might lead to an increased number of undiagnosed cases[8]. The higher risk patient population manifests symptoms typical of pneumonia or acute respiratory distress syndrome

Possible transmission routes of 2019-nCoV in dental clinics

Dental care settings invariably carry the risk of 2019-nCoV infection due to the specificity of its procedures, which involves close proximity with patients, frequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. The pathogenic microorganisms can be transmitted in dental settings through direct contact with blood, oral fluids, or other patient materials[9], contact of conjunctival, nasal, or oral mucosa with droplets and aerosols containing microorganisms generated from an infected individual and propelled a short distance by coughing and talking without a mask, and indirect contact with contaminated instruments and/or environmental surfaces.

Airborne spread

The airborne spread of SARS-Cov (severe acute respiratory syndrome coronavirus) is well- reported in many literatures. The dental procedures produce aerosols and droplets that may be contaminated with virus. Thus, droplet and aerosol transmission of 2019-nCoV are the most important concerns in dental clinics and hospitals[10]. In addition to the infected patient's cough and breathing, dental devices such as high-speed dental handpiece which work with running water when used in the patient's oral cavity generate a large amount of aerosol and droplets mixed with the patient's saliva or even blood . Particles of droplets and aerosols which are small may stay airborne for an extended period before they settle on environmental surfaces or enter the respiratory tract. Thus, the 2019-nCoV can spread through droplets and aerosols from infected individuals in dental clinics and hospitals.

Contact spread

A dental professional's contact with human fluids, patient materials, and contaminated dental instruments or environmental surfaces makes a possible route to the spread of viruses[10]. In addition, dental professionals and other patients have likely contact of conjunctival, nasal, or oral

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mucosa with droplets and aerosols containing microorganisms generated from an infected individual and propelled a short distance by coughing and talking without a mask.

Contaminated surfaces spread

Human coronaviruses such as SARS-CoV can persist on surfaces like metal, glass, or plastic for up to a couple of days[11]. Therefore, contaminated surfaces in the healthcare settings are a potential source of coronavirus transmission. In dental practice droplets and aerosols from infected patients can contaminate the whole surface in dental offices. In addition, it was shown that at room temperature HCoV remains infectious from 2 hours to 9 days, and persists better at 50% relative humidity. Thus, keeping a clean and dry environment in the dental office can minimise the persistence of 2019-nCoV.

Diagnosis and Management

"Screening and triage: Screening and isolation of all patients with suspected COVID-19 at the first point of contact with the health care system (such as the emergency department or outpatient department/clinic) should be done. Suspected COVID-19 patients should be given a mask and directed to separate area. Keep at least 1 m distance between patients. Standard precautions should always be applied in all areas of health care facilities which include hand hygiene and use of personal protective equipment (PPE) when in indirect and direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Standard precautions also include prevention of needle-stick or sharps injury; safe waste management; cleaning and disinfection of equipment; and cleaning of the environment. In addition to standard precautions, health care workers should do a point-of-care risk assessment at every patient contact to determine whether additional precautions (e.g. droplet, contact, or airborne) are required.

Precautions and protocols to be followed in Dental Practice

Dental professionals should be aware of ways of 2019-nCoV spread and should able to identify patients with 2019-nCoV infection, and extra-protective measures that should be adopted during the practice, in order to prevent the transmission of 2019-nCoV. The following are the recommended infection control measures that should be followed by dental professionals, particularly considering the fact that aerosols and droplets are considered as the main spread routes of 2019-nCoV.

1. In general, a patient with COVID-19 who is in the acute febrile phase of the disease is not recommended to visit the dental clinic. If this does occur, the dental professional should be able to identify the patient with infection, and should not treat the patient in the dental clinic, but immediately quarantine the patient and report to the infection control department as soon as possible.
2. The body temperature of the patient should be measured for every patient. A contact- free forehead thermometer is recommended for the screening.
3. A questionnaire should be used to screen patients with potential infection of 2019- nCoV before they could be led to the dental chair-side.

These questions should include the following:

(i) Do you have fever or experienced fever within the past 14 days?

ii) Have you experienced a recent onset of respiratory problems, such as a cough or difficulty in breathing within the past 14 days?

(iii) Have you, within the past 14 days, travelled to any other state or country with

documented 2019-nCoV transmission?

(iv) Have you come in contact with a patient with confirmed 2019- nCoV infection within the past 14 days?

(v) Have you come in contact with people who came from other states or countries with recent documented fever or respiratory problems within the past 14 days?

(vi) Are there at least two people with documented experience of fever or respiratory problems within the last 14 days having close contact with you?

(vii) Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?

If a patient replies "yes" to any of the screening questions, and his/her body temperature is below 37.3°C, the dentist can defer the treatment until 14 days after the exposure event. The patient should be instructed to self-quarantine at home and report any fever experience or flu- like syndrome to the local health department.

If a patient replies "yes" to any of the screening questions, and his/her body temperature is no less than 37.3°C, the patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department. If a patient replies "no" to all the screening questions, and his/her body temperature is below

37.3 °C, the dentist can treat the patient with extra protection measures, and avoids spatter or aerosol-generating procedures to the best.

If a patient replies "no" to all the screening questions, but his/her body temperature is no less than 37.3 °C, the patient should be instructed to the fever clinics or special clinics for COVID- 19 for further medical care.[12]

4. The dentists should wash their hands before patient examination or dental procedures and after touching the patient, after touching the surroundings or equipment and after touching the oral mucosa, damaged skin or wound, blood, body fluid, secretion, and excreta. The dental professionals should avoid touching their own eyes, mouth, and nose.

5. Avoidance of all aerosol generating procedures until the pandemic is declared to be under control by the health authorities.

6. Since droplet transmission of infection is considered as the main route of spread, particularly in dental clinics and hospitals, barrier-protection equipment, including protective eyewear, masks, gloves, caps, face shields, and protective outwear, is strongly recommended for all healthcare givers in the clinic/hospital.

7. Based on the possibility of spread of 2019-nCoV infection, three-level protective measures of the dental professionals are recommended for specific situations.

   i. Primary protection (standard protection for staff in clinical settings). Wearing disposable working cap, disposable surgical mask, and working clothes (white coat), using protective goggles or face shield, and disposable latex gloves or nitrile gloves if necessary.

   ii. Secondary protection (advanced protection for dental professionals). Wearing disposable doctor cap, disposable surgical mask, protective goggles, face shield, and working clothes (white coat) with disposable isolation clothing or surgical clothes outside, and disposable latex gloves.

   iii. Tertiary protection (strengthened protection when contact patient with suspected or

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confirmed 2019-nCoV infection). Although a patient with 2019-nCoV infection is not expected to be treated in the dental clinic, in the unlikely event that this does occur, and the dental professional cannot avoid close contact, PPE is needed. In addition, disposable doctor cap, protective goggles, face shield, disposable surgical mask, disposable latex gloves, and impermeable shoe cover should be worn.[12]

8. Proper Donning and Doffing protocols should be followed when using PPE.
9. Since 2019-nCoV is vulnerable to oxidation, preprocedural mouth rinse containing oxidative agents such as 1% hydrogen peroxide or 0.2% povidone is recommended, for the purpose of reducing the salivary load of oral microbes, including potential 2019- nCoV carriage.[12]
10. Patients should be instructed to keep their hands in pockets without touching anywhere on the dental chair. Asymptomatic treatments to be deferred.
11. The use of rubber dams minimizes the production of saliva- and blood-contaminated aerosol or splatter, particularly in cases when high-speed handpieces and dental ultrasonic devices are used.
12. The anti-retraction high-speed dental handpiece can significantly reduce the backflow of oral bacteria and HBV into the tubes of the handpiece and dental unit as compared with the handpiece without anti-retraction function. Therefore, the use of dental handpieces without anti-retraction function should be avoided during this period.[12]
13. So any treatment generating splatter should be done with complete disposable PPE along with rubber dam isolation, and saliva ejectors. Post splatter treatment strict fumigation to be done of operatory.[13]
14. Before and after each session meticulous floor mopping, handle disinfection, disinfection of dental chair, trays, spittoon, operatory and waiting area to be done.[13]
15. Handpieces, burs, diagnostic instruments have to be stringently autoclaved in sealed pouches. Used burs should be soaked in a solution like orocid prior to autoclaving. Root canal files should be single use and preferably a single visit under dam.
16. Impressions should be effectively disinfected prior to dispatch to laboratories.
17. Fumigation with a quaternary ammonium compound must be performed every day to ensure that all low contact areas are also disinfected.
18. Minimal use of air conditioners and regular cleaning of filters.
19. Disposal of the PPEs and biomedical waste done judiciously.
20. Double-layer yellow colour medical waste package bags and "gooseneck" ligation should be used. The surface of the package bags should be marked and disposed according to the requirement for the management of medical waste.[13]

Conclusion

Due to the characteristics of dental settings, the risk of cross infection can be high between patients and dental practitioners. For dental practices and hospitals in areas that are affected with COVID-19, strict and effective infection control protocols are mandatory. Universal precautions are critical to minimize the spread of this virus. It is to be noted that case presentations can be dynamic, and there is a good chance that dentists might treat some of asymptomatic patients with COVID-19 infections since the incubation period can range

from 0-24 days and most patients only develop mild symptoms11. Thus, every patient should be considered as potentially infected, and all dental professionals need to review their infection control policies. Health care providers must keep themselves updated about this evolving disease and provide adequate training to their staff to promote many levels of screening and preventive measures allowing dental care to be provided, while mitigating the spread of this novel infection.

Also, the dip in economy due the world wide covid outbreak might have significant impact on the patient inflow affecting dental profession which needs to be addressed separately.

In conclusion, healthcare professionals have the duty to protect the public, and maintain high standards of care and infection control.

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