

TRANSMISSION AND PREVENTION OF 2019-NCOV IN DENTISTRY**Jyoti Tripathi^{*1}, Nivedita Tripathi² and G. Ajay Kumar³**¹Post Graduate Student, Department of Prosthodontics, Army College of Dental Sciences, Secunderabad, Telangana, India.²Undergraduate Student, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow, Uttar Pradesh, India.³Head of the Department, Department of Prosthodontics, Army College of Dental Sciences, Secunderabad, Telangana, India.***Corresponding Author: Dr. Jyoti Tripathi**

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ABSTRACT

A highly infectious pandemic respiratory disease is spreading from one to another by different routes of transmission case by novel coronavirus 2019-nCoV. This virus was first explored in Wuhan City, Hubei Province, China. This virus is causing serious health risk in the population worldwide. The virus causing the disease is not the normal corona virus that normally circulate among human and causes mild common cold and illness. The person-to-person Transmission modes of 2019-nCoV included direct transmission, such as coughing, sneezing, droplet inhalation, and contact spread, such as the contact with oral, nasal, and eye mucosal membrane. The dental clinician are at high risk of 2019-nCoV infection due to the face-to-face communication and the exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. This review explains about various routes of transmission and measures of infection control of 2019-nCoV.

KEYWORDS: Airborne, Aerosol, Infectious, Pneumonia, Transmission.**INTRODUCTION**

Wuhan, Hubei province of china announced the first report of cluster of cases of unexplained pneumonia on December 2019 which gathered attention not only within china but internationally.^[1] Chinese health authority took immediate measures for the control and spread of the disease, isolation of people who already had disease, monitoring the close contacts with the positive cases, setting up new diagnostic centers and treatment procedures. World health organization declared emergency worldwide for this outbreak of pneumonia like disease on last week of January 2020.

Clinical symptoms in the patients who suffered from this novel virus, appeared in the start were mild sore throat, cough, headache, fever and myalgia later on including pneumonia like symptoms which were chest pain, breathing distress, sputum production, headache, hemoptysis and diarrhea.^[2-4] This disease was causing respiratory distress mainly to the elder population.^[5,6] The Chinese health authority said that the patients initially tested negative for common respiratory viruses and bacteria, but later tested positive for a novel coronavirus.^[7] The WHO tentatively declared this virus as 2019 novel corona virus [2019-nCoV]. The virus was soon isolated and its genome sequenced by a number of Chinese Scientists.^[8] Some of the clinical symptoms

were different from the severe acute respiratory syndrome (SARS) caused by SARS coronavirus (SARS-CoV) that happened in 2002–2003, indicating that a new person-to-person transmission infectious agent has caused this emergent viral pneumonia outbreak.^[6,9] On 11th February 2020, WHO named the novel viral pneumonia as “Corona Virus Disease (COVID19)”, while the international Committee on Taxonomy of Viruses (ICTV) suggested this novel coronavirus name as “SARSCoV-2” due to the phylogenetic and taxonomic analysis of this novel coronavirus.^[10]

WHAT IS 2019 NOVEL CORONAVIRUS?

Coronaviruses are enveloped RNA viruses that are distributed broadly among humans, other mammals, and birds and that cause respiratory, enteric, hepatic, and neurologic diseases.^[11,12]

Severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) — are found in humans and animals and have been linked to sometimes fatal respiratory illness.^[13] SARS-CoV was the causal agent of the severe acute respiratory syndrome outbreaks in 2002 and 2003 in Guangdong Province, China.^[6-8,9,14-16]

2019-nCoV explored in Wuhan is member of the β -CoV according to the phylogenetic analysis based on the viral genome.^[17,18] 2019-nCoV can also cause the fetal infection and spread more faster than the two other coronaviruses.^[5,9,18-21]

The genome nucleotide sequence between a coronavirus (BatCoV RaTG13) detected in the bat *Rhinolophus affinis* from Yunnan Province, China, and 2019-nCoV, was 96.2%, suggesting that the natural host of 2019-nCoV may also be the *Rhinolophus affinis* bat.^[8] Although the differences may also suggest of any intermediate host between bat and human.

MODES OF TRANSMISSION

Human to human transmission, cases which are positive for covid-19 are the main source of transmission. Recent studies suggest that asymptomatic patients who are on incubation period are carrier for SARS-CoV-2.^[22] In addition, studies have shown that respiratory viruses can be transmitted from person to person through direct or indirect contact, or through coarse or small droplets, and 2019-nCoV can also be transmitted directly or indirectly through saliva. The pathogenic microorganisms can be transmitted in dental settings through inhalation of airborne microorganisms that can remain suspended in the air for long periods^[23], direct contact with blood, oral fluids, or other patient materials^[24], 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^[25,26] and indirect contact with contaminated instruments and/or environmental surfaces.^[27]

1. AIRBORNE

It is an airborne infection according to many literature and can be spread through droplets. Many routine dental

procedure produces aerosols and droplets which suspend in air for long period of time and can be infectious are infected with viruses.^[28] Therefore, droplets and aerosols are major route of transmission for this 2019-nCoV and are major concern in dental hospital and clinics as it is difficult to avoid aerosol mixed with patient's saliva and blood during dental procedures. Dental procedures requires use of high speed machines such as high speed airtor, hand piece, which requires water when used at very high speed. These machines produce aerosol in high quantity mixed with patient's saliva and blood which is highly infectious. These droplets and aerosols are very minute in size that they suspend in air for very long period of time and after that they get settled over the surfaces or may enter the respiratory tract while breathing. Therefore 2019-nCoV is highly infectious and can be easily spread via droplets and aerosols in dental hospitals and clinics.

2. PERSON TO PERSON CONTACT

The virus can be passed directly from person to person by respiratory droplets; emerging evidence suggest that it can be spread through person to person contact and fomites.[Fig.1] 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. Dental care settings invariably carry the risk of infection due to the specificity of its procedures, which involves face-to-face communication or direct transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes).

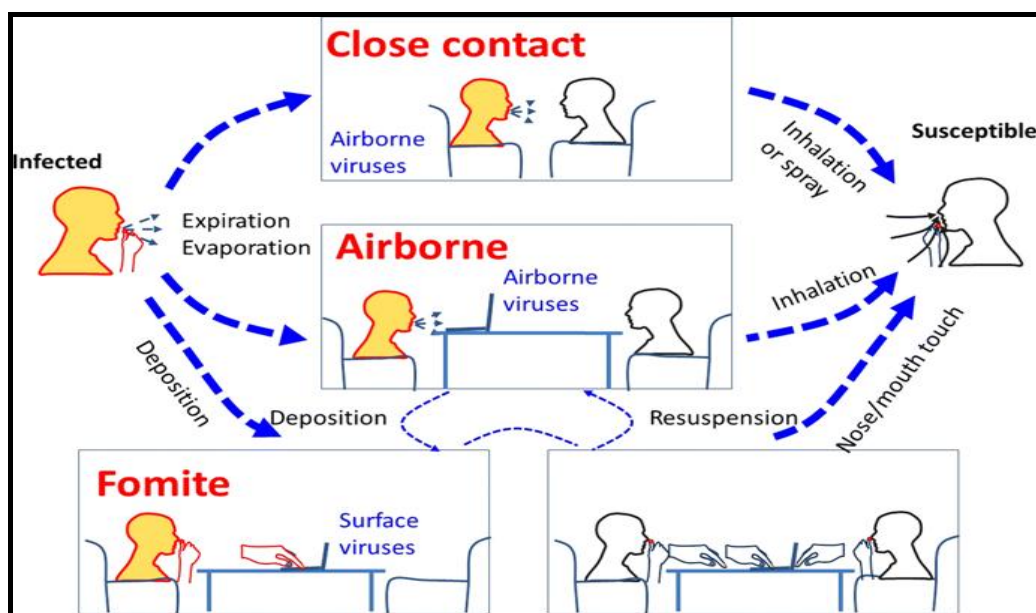


Fig.1

3. CONTAMINATED SURFACES

Aerosols and droplets generated during the procedures often settled over the working surfaces and other areas making them infectious and potentially hazardous for the spread of infection.

Studies have shown that the virus remains active over the surfaces for approximately up to 2hrs to 9 days and survives even in humidity. Therefore the surfaces which are contaminated are potential source of transmission. Thus, clean and disinfect public areas frequently, including door handles, chairs and bathrooms.

MINIMIZING EXPOSURE, INFECTION CONTROL AND TRANSMISSION

Dental practitioners should be well educated about the virus 2019-nCoV and its spread, protective measures in order to prevent disease transmission. Here, we will describe few measures to control and prevent spread of infection taking in consideration that dental procedures are one of the major ways for the spread of infection.

Dental professional should be able to evaluate and identify patients with the symptoms of covid-19 and immediately should suspend the treatment. They should isolate the patient and inform about the patient to the infection control health workers as soon as possible. Take a detailed travel and health history when confirming and scheduling patients. Maintain record and contact details and address of all patients treated.

The body temperature should be measured first and foremost before allowing the patient in premises with the help of contact free forehead thermometer. Take temperature readings as part of the routine assessment of patients before performing dental procedures. Medical history should be taken of each and every patient asking following question:

If patient has any fever from past 14 days?

If patient has any flu like symptoms like sore throat, throat pain, running nose, watery eyes?

If patient has difficulty in breathing or cough from past 14 days?

If patient has travelled affected countries like china, European countries like Spain, Germany or Middle Eastern Countries where the situation is not under control and disease has been declared epidemic according to world health organization.

If patient has come in contact with positive cases of 2019-nCoV?

If patient's came in close contacts with people who detected positive for the disease?

If patient has recently participated in social gathering event?

If patient answers "yes" to the questions and his or her body temperature is under 37.3 degree Celsius, suspend the treatment and ask patient to self-quarantine at home for 14 days period and inform to local health care professionals if any flu like symptoms appears.

If patient answers "yes" to the questions and his or her body temperature is above 37.3 degree Celsius the patient should be immediately quarantined and the case should be informed to higher authority health care department.

If patient answer "no" to all the questions and his or her body temperature is under 37.3 degree Celsius a dentist can treat the patient with extra precautionary measures avoiding the procedures which produce aerosols, droplets and splatters.

If a patient answers "no" to all the questions and his or her body temperature is not less than 37.3 degree Celsius the patient should be instructed to special clinics running for 2019-nCoV for further medical care.

A. SELF-PROTECTIVE MEASURES

Although no specific guidelines are present now as per the record but to prevent infection from 2019-nCoV dental professionals should avoid touching face, mouth, eyes and nose with unwashed hands. Wear surgical masks, eye wear, gloves, head caps, face shields, aprons during all the dental procedures to avoid infection from 2019-nCoV. Wear gowns to protect skin and prevent soiling of clothes during dental treatment activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.

Since the transmission route is primarily airborne and droplet avoid use of high speed turbine arotors which produce high quantity aerosols, droplets, secretions and splatters of saliva and blood. Stop all the elective procedures which can create infectious environment.

B. MEASURES BEFORE STARTING EXAMINATION

Ask the patient to use mouth rinse before starting with treatment to reduce harmful microbes. Although, as mentioned in Guidelines for the Diagnosis and Treatment of Novel Coronavirus.

Pneumonia (the 5th edition) published by the National Health Commission of the People's Republic of China, Chlorhexidine mouthwash, which is commonly used as mouthwash in dentistry, may not be effective to kill 2019-nCoV. 2019-nCoV is sensitive to oxidative mouthwashes with content of 1% Hydrogen Peroxide or 0.2% Povidone. These mouth rinse are effective to decrease salivary load of oral microbes including 2019-nCoV virus.

C. PREVENTION OF AIRBORNE INFECTION

Droplets and aerosols transmission of 2019-nCoV are the chief concerns in dental practice and hospitals, because it is hard to avoid the generation of large amounts of aerosol and droplets mixed with patient's saliva and even blood during dental practice. High speed arotors produce large quantity of aerosol and droplets which are highly infectious therefore, anti-retraction hand piece can be used to minimize the infection spread which aspirate the aerosol and infectious droplets. Our study has shown

that the anti-retraction high-speed dental hand piece can significantly reduce the backflow of oral bacteria and HBV into the tubes of the hand piece and dental unit as compared with the hand piece without anti-retraction function.^[29] Anti-retraction dental hand piece with specially designed anti-retraction valves or other anti-reflux designs are strongly recommended as an extra preventive measure for cross infection.^[30]

D. DISINFECTION OF SURFACES

Medical colleges, institutions and hospitals should do routine disinfection of clinical space and public places on a regular basis to avoid the 2019-nCoV virus. Dental Offices also should follow routine cleaning and disinfection strategies used during flu season. Fumigation of the working and clinical operation areas should be carried on regular basis. Proper Handling of appliances soiled with blood, body fluids, body secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment. Clean, disinfect, and reprocess reusable equipment appropriately before using it on another patient.

E. DAILY HAND HYGIENE

Wash hands with soap and water for at least 20 to 30 seconds after coming in contact with patients or use an alcohol-based hand sanitizer with at least 60% alcohol if soap and water are not available. (These recommendations already are part of Standard Precautions.)

Wash hands before and after the procedure irrespectively gloves have been worn, immediately after removing gloves if any invasive procedures are done. After touching blood soiled cottons, gauges soaked with blood during procedure, body fluids, secretions, excretions, non-intact skin, and contaminated appliances, even if gloves are worn washing hands are mandatory as a precautionary measure.

F. WASTE MANAGEMENT

Ensure safe waste management by disposing the waste in guided manner. The disposable medical waste should be transferred to the temporary storage area of the medical institute regularly. The instrument and equipment which can be reused should be washed, properly cleaned, dried, sterilized, and properly stored according to the Protocol for the Disinfection and Sterilization. The medical and domestic waste produced by the treatment of patients with suspected or confirmed cases of 2019-nCoV infection are categorized as infectious waste materials. Double-layered yellow colored medical waste disposal bags and "gooseneck" ligation should be used.

WHO GUIDELINES

We must be constantly aware of infectious threats that may challenge the current infection control regimen, especially in dental practices and schools of dental

medicine. Maintain at least 1 meter (3 feet) distance between yourself and anyone who is coughing or sneezing.[WHO] Thoroughly and regularly clean your hands with an alcohol-based hand sanitizer or wash them with soap and water. Washing your hands with soap and water or using alcohol-based hand rub kills viruses that may be on your hands. If you have fever, cough and difficulty breathing, seek medical care early. Stay home if you feel unwell. If you have a fever, cough and difficulty breathing, seek medical attention and call in advance. Follow the directions of your local health authority. National and local authorities will have the most up to date information on the situation in your area. Calling in advance will allow your health care provider to quickly direct you to the right health facility. This will also protect you and help prevent spread of viruses and other infections.

SUMMARY

Although clinics are closed in this epidemic situation, still a large number of emergency patients are going for dental treatment. In this review we have mentioned all the possible routes of transmission, contamination, contact spread. This review article also explains about blocking the transmission of 2019-nCoV infection and protective measures in dental practice. We also reviewed recent who guidelines for safety and different measures to prevent the spread of infection like avoiding social contact, patient examination, hand hygiene and waste management techniques.

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