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Covid-19: A Health Care Emergency and Potentional Risk for Dental Health Professionals

[1]Dr Abhishek Jain, MDS-3rd Year, Department of Pedodontics and Preventive Dentistry, Shree Bankey Bihari Dental College, Ghaziabad, Uttar Pradesh.

[2]Sumera Pervaiz Khan, BDS, Shree Bankey Bihari Dental College, Ghaziabad, Uttar Pradesh.

Corresponding author: Dr Abhishek Jain, MDS-3rd Year, Department of Pedodontics and Preventive Dentistry, Shree Bankey Bihari Dental College, Ghaziabad, Uttar Pradesh.

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Abstract

A new strain of Corona virus has been held responsible for this rapidly out bursting pandemic resulting in severe acute respiratory disorder, which has already caused numerous deaths around the world. Covid-19 has already caused thousands of deaths all over the world and still there is no definitive cure available. This virus is a new human-infecting *Betacoronavirus*, that based on its genetic proximity to 2 bat-derived SARS like coronaviruses, likely originated in chrysanthemum bats. Major symptoms include high grade fever, dry cough, shortness of breath and fatigue. These may be associated with diarrhoea, body ache and tiredness. In severe cases, there can be viral pneumonia, multi organ dysfunction and even death. The Centre for Disease Control has developed a test kit that can check the patient's specimen for SARS coronavirus 2 which is known as centre for disease control and prevention 2019-novel coronavirus real-rime reverse transcriptase-Polymerase Chain Reaction (RT-PCR) diagnostic panel. COVID-19 is a novel disease and there is no definite treatment available for its prevention or cure. Certain medication combinations have been tried but still there is no definitive treatment available. Preventive measures must be undertaken to prevent transmission of this deadly virus. Dental professionals are at the maximum risk of receiving and transmitting COVID-19. Proper protective equipment should be worn by all the health professionals and non emergency care should be suspended for the time being.

Keywords: COVID-19, Corona, Novel Coronavirus, SARSCoV2.

The whole world today, is talking about the new war that has begun against mankind; the deadly COVID-19. Chinese government reported a series of pneumonia like disease in its Wuhan district to World Health Organisation on 31st December 2019. All the initial victims reported to have visited to Huanan sea food market and as a precautionary measure this market has been shut for the time being. A new strain of Corona virus has been held responsible for this rapidly out bursting pandemic

resulting in severe acute respiratory disorder, which has already caused numerous deaths around the world. Corona viruses are a group of viruses, which are normally present among animals such as cows, bats, camels and cats. A phenomenon called “spill over” has been observed during this outbreak where this virus could jump from animals to humans and from humans to humans. This spill over phenomenon and a continuous mutation in this virus is the biggest setback in finding a definitive cure for this disease. This new coronavirus was first isolated on 7th January 2020 and was tentatively named as 2019-nCoV (2019 Novel Corona Virus) on 17th January 2020. (1) The International Committee on Taxonomy of Viruses named the virus as SARSCoV-2 due to its resemblance to SARS (Severe Acute Respiratory Syndrome) coronavirus.(2) It was on 11th February 2020 WHO gave this disease its name: COVID-19. (1,2)

History of Coronavirus

Human coronaviruses (HCoVs) was considered as an inconsequential pathogen and was known to cause common cold. However, the 21st century witnessed two highly pathogenic HCoVs—Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) which emerged from animal reservoirs to cause global epidemics with alarming morbidity and mortality. (2,3)

2019 Novel Coronavirus

Coronaviruses are large, enveloped, positive strand RNA viruses that can be divided into 4 genera: alpha, beta, delta, and gamma, of which alpha and beta CoVs are known to infect humans. Four HCoVs (HCoV 229E, NL63, OC43, and HKU1) are endemic globally and account for 10% to 30% of upper respiratory tract infections in adults. Coronaviruses are ecologically diverse with the greatest variety seen in bats, suggesting that they are the reservoirs for many of these viruses. This virus is a new human-infecting *Betacoronavirus*, that based on its genetic proximity to 2 bat-derived SARS like coronaviruses, likely originated in chrysanthemum bats. Peridomestic mammals such as pangolin (a scaly anteater) may serve as intermediate hosts, facilitating recombination and mutation events with expansion of genetic diversity. The virus uses a densely glycosylated spike (S) protein to enter host cells and binds with high affinity to the angiotensin-converting enzyme 2 (ACE2) receptor in humans in a manner similar to SARS-CoV. However, monoclonal antibodies against the receptor-binding domain of SARS-CoV do not exhibit much binding to SARS-CoV-2, confirming that this is a new virus. The ACE2 enzyme is expressed in type II alveolar cells, and some unconfirmed data suggest that Asian males have a large number of ACE2-expressing cells in the lung, which may partially explain the male predominance of COVID-19. However, other factors such as a higher prevalence of smoking among men in China may explain the difference in the sex distribution of the disease. (3)

Clinical Features of Covid-19

Major symptoms include high grade fever, dry cough, shortness of breath and fatigue. These may be associated with diarrhoea, body ache and tiredness. In severe cases, there can be viral pneumonia, multi organ dysfunction and even death. But just these initial symptoms do not confirm COVID-19 as they may be due to FLU or common cold. COVID can be suspected if these symptoms are present along with any of these:

1. A recent history of travel to a coronavirus infected area (like China, Iran, Italy, Republic of Korea etc)
2. Close contact with a suspect of COVID-19
3. Visiting a health care facility/lab where corona virus patients are being taken care of.

However the time interval between catching the virus and appearance of symptoms is between 2-14 days and symptoms appear gradually.

This Pandemic has been divided into 4 stages and as these stages advance, they mark a higher transmission potential and mortality rate. Stage 1 marks the initial contact with the virus and symptoms include fever and cough. Stage 2 shows a further increase in temperature, worsening of cough and shortness of breath along with gastro-intestinal symptoms such as diarrhoea or loss of appetite. In Stage 3 it is observed that fever is not present but the patient needs emergency care in this stage due to acute respiratory disease and sepsis. If the condition deteriorates further patient may land up in Stage 4 which marks the most deadly concourse of this disease wherein multiple organs are involved like heart and kidney, immunity crashes and this may cost life of the patient. (4,5,6)

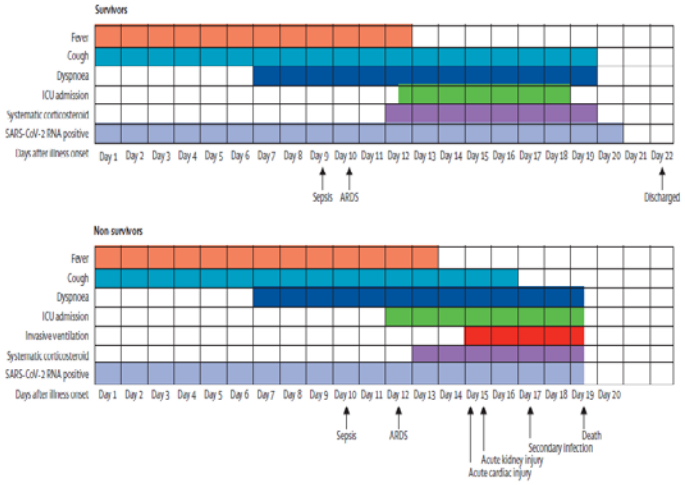

Figure: 1 represents clinical outcomes in survivors and non survivors (6).

Mode of Transmission

The mechanism for transmission of COVID-19 is still not clear. As per current understanding of various researchers, transmission is human to human, and it is thought to be spread through respiratory droplets from coughs or sneezes. Primary cases of COVID-19 have been traced back to the Huanan seafood market, China, with secondary cases occurring at hospitals among nurses and physicians who had extensive contact with COVID-19 patients. Later on, several individuals who did not have direct contact with the Huanan seafood market were diagnosed with the disease. High viral loads have been detected in saliva which is a major concern for dental health care professionals. Furthermore, fomites, faecal transmission and handling of animals (killing, selling or preparing wild animals) are being considered as less common methods of transmission. (7)

SARS have been known to spread as nosocomial infection through aerosol generation during intubation. Dental procedures such as Scaling using a ultra-sonic scaler and Cavity preparation/ Crown preparation/ Access cavity preparation for root canal treatments using a high speed airroter generates immense aerosols that could act as potential carrier of viral loads in a dental clinic. This could be a major source of COVID-19 transmission.

Epidermiology of Covid-19

WHO published a situation report on COVID-19 on 17th March 2020 and gave a statistics on the spread of this pandemic. China has the maximum number of confirmed infected cases which is estimated around 81116 and death troll has crossed 3231, followed by Italy with confirmed infected cases around 27980 and death troll around 2503. Iran has approximately 15000 confirmed cases while Spain and Republic of Korea has over 8000 confirmed cases. France, Germany, United States of America, Switzerland, The United Kingdom, Netherlands, Sweden, Austria, Belgium and Sweden have thousands of confirmed cases. The reported number of cases are increasing exponentially in the south east Asian region and maximum cases in this region are in Indonesia, Thailand and India.(8) In the third week of this pandemic number of confirmed cases in India on 21st March 2020 are 276 and the number of new cases detected within a

week is 139. Local transmission of this virus can affect hundreds of thousand people if strict precautionary measures will not be undertaken.

Diagnosis of Covid 19

People exhibiting the symptoms of severe acute respiratory illness like cough, cold, fever, and difficulty of breathing or anyone who has a history of travel to Wuhan, China 14 days prior to the onset of symptoms are ideal candidates to be screened for this deadly disease. Based on recommendation of a medical health care professional following samples can be obtained for testing of COVID 19:

Nasopharyngeal and oropharyngeal swab : Using a Dacron or polyester flocked swabs. The ideal temperature for transportation is 4 degrees Celsius and for storage is 70 degrees Celsius, especially if it is more than five days' post specimen collection.

Bronchoalveolar lavage and Tracheal aspirate/nasopharyngeal aspirate/nasal wash: The specimen is placed in a sterile container at a temperature of 4 degrees Celsius. If it is way pass 48 hours post specimen collection, store the specimen in less than 70-degree Celsius temperature.

Sputum: The specimen is placed in a sterile container at a temperature of 4 degrees Celsius. If it is way pass 48 hours post specimen collection, you have to store the specimen in less than 70-degree Celsius temperature.

Tissue from biopsy/autopsy of the lungs: The specimen is placed in a sterile container with saline at a temperature of 4 degrees Celsius. If it is way pass 24 hours post specimen collection, you have to store the specimen in less than 70-degree Celsius temperature.

Serum (acute and convalescent) : A serum separator tube is used to collect the specimen and transported to the lab immediately. If it needs to be transported and passed five days post specimen collection, the temperature of the specimen should be not more than 70 degrees Celsius.

CT Chest can be advised in cases reporting with severe respiratory diseases to detect level of lung destruction. The Centre for Disease Control has developed a test kit that can check the patient's specimen for SARS coronavirus 2 which is known as centre for disease control and prevention 2019-novel coronavirus real-rime reverse transcriptase-Polymerase Chain Reaction (RT-PCR) diagnostic panel. It should be used with applied biosystem 7500 fast DX real-time PCR instrument with SDS 1.4 software. The test kit is used to check for specimens of the upper and lower respiratory tract of a person that meets the criteria of CDC for coronavirus disease 2019. The test kit should only be used by CDC approved laboratories.

Treatment Options till Date

COVID-19 is a novel disease and there is no definite treatment available for its prevention or cure. Supportive treatment such as oxygen by high-flow nasal cannula and non invasive ventilation are being provided to the patients. Certain drug combinations have been tried with little success. A team of doctors from Sawai Man Singh Hospital and Medical College, Jaipur, Rajasthan have come up with a combination of two anti retro viral drugs (which belong to protease inhibitor class) Lopinavir 200mg and Ritonavir 50mg along with Chloroquine (a drug dedicated towards treatment of malaria) as a treatment option for COVID 19. Indian Council of Medical Research have approved this combination following 3 cases who were positive with novel coronavirus turned negative with this treatment.

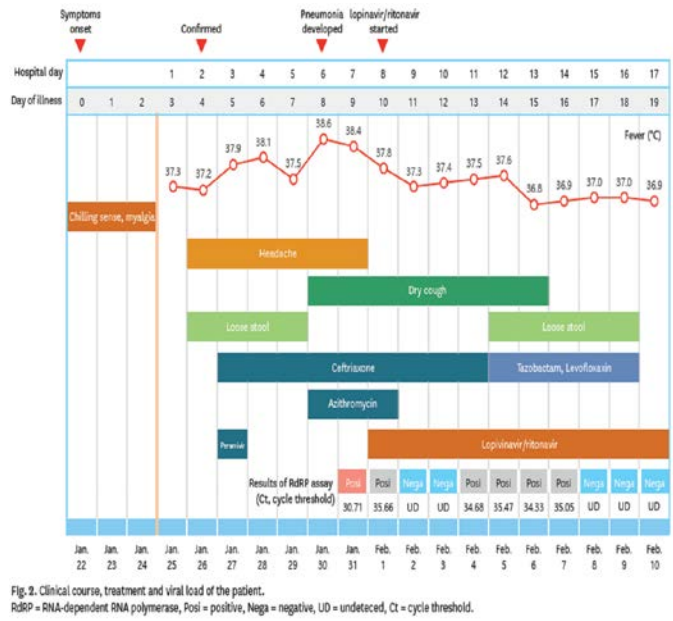

Fig. 2. Clinical course, treatment and viral load of the patient.
RdRP = RNA-dependent RNA polymerase, Posi = positive, Nega = negative, UD = undeteced, Ct = cycle threshold.

Figure 2: Clinical course and anti viral therapy for COVID 19 patients (12)

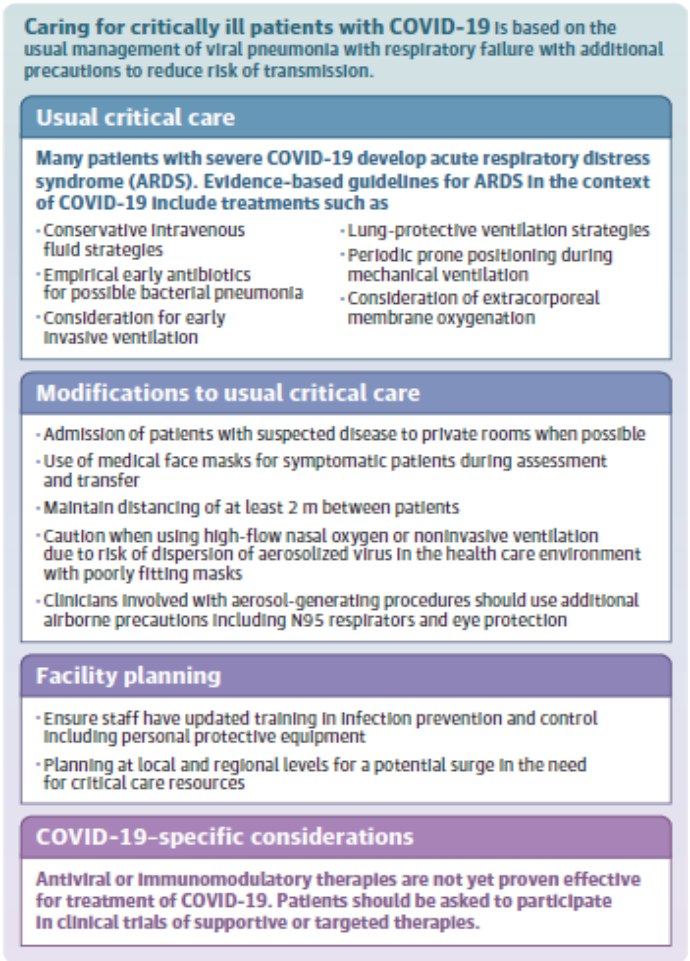

Figure 3: Critical Care for COVID 19 patients (13)

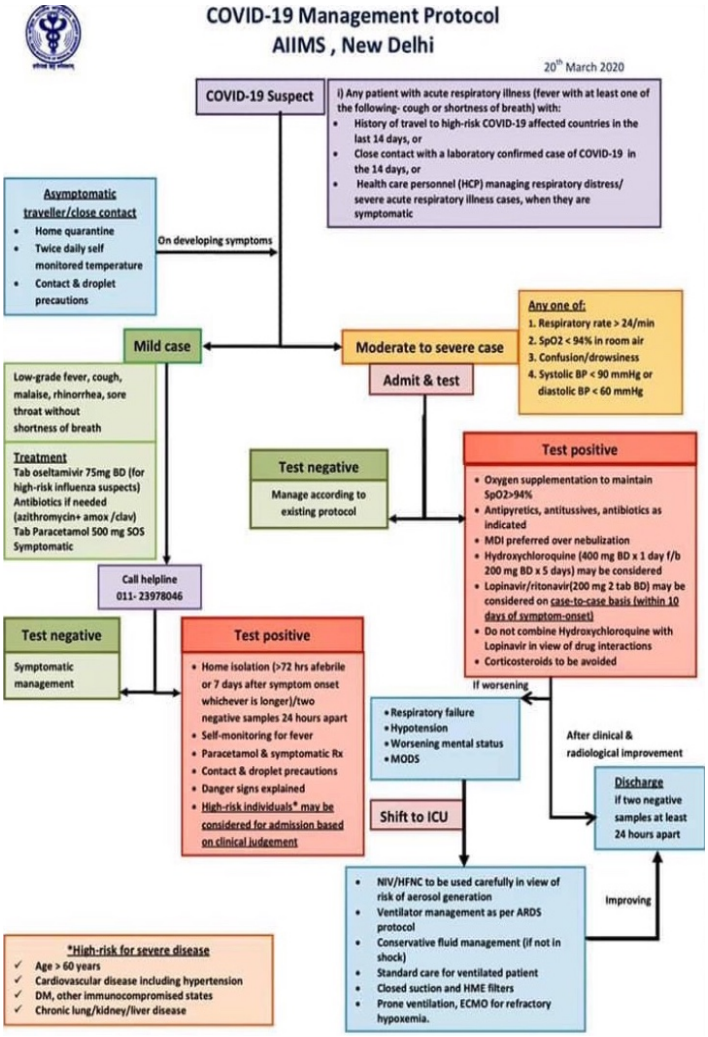

Figure 4: All India Institute of Medical Sciences have issued guidelines for treatment of COVID-19.

Preventive Measures

"Prevention is better than Cure." We all have heard this idiom several times and it stands completely true in the present scenario. In the present day, we can only win the battle against corona by not letting it spread.

1. Hand washing with soap and water or alcohol based hand sanitizer for at least 20 seconds frequently can protect transmission of this disease.
2. Avoid touching face, mouth, eyes and ears specially with dirty hands.
3. If anyone has cold/flu like symptoms, Isolate yourself and seek medical help initially on phone call.

4. Maintain a minimum of 3 feet distance from anyone who is coughing and sneezing.
5. Cover face with tissue or inside of elbow while sneezing or coughing.
6. Caution should be undertaken to disinfect the regularly used items such as mobile phones, door knobs, door bells, elevator buttons etc several times in a day.
7. Anyone suspected must undergo quarantine for 14 days to prevent transmission to others.
8. Avoid going to public places.
9. Disinfect any kind of courier or item delivered to your place before touching them and if possible do not touch them for 10-12 hours.

Conclusion

It is extremely important to protect the health care professionals and other patients from nosocomial transmission of this viral infection in the hospitals. Dental health care professionals should maintain appropriate distancing of at least 2m between patients with suspected or confirmed to have COVID-19, and personal protective equipment such as face mask, head cap, protective eye wear, disposable gown, shoe covers etc should be worn at all the time. It is extremely important to train staff in the clinics and hospitals to stay alert and protected from transmission of this disease. Aerosol-generating procedures such as ultrasonic scaling and use of high-speed hand piece must be avoided as far as possible and only emergency cases should be treated. Every attempt should be made to educate the patients regarding transmission and preventive measures to fight against COVID-19. Cleaning staff should be provided with appropriate protective equipment so that they also stay protected. Though cleaning of instruments and fumigation of the operatory is extremely important. Every patient that enters dental clinic should be provided with alcohol based hand sanitizer. Appropriate medical and travel history should be recorded for all patients. If we will we able to contain transmission of this pandemic, we will be in a state to fight it. We offer condolence to all those who lost their life due to this viral outbreak and we pray for a speedy recovery for those who are fighting with this disease.

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