

## Understanding of Novel Coronavirus Disease 2019 (2019-nCoV): Newest and Biggest Emerging Threat in the Dental Practice

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### Abstract

A novel  $\beta$ -coronavirus (2019-nCoV) caused severe and even fatal respiratory disorder explored in a seafood market of Wuhan town, Hubei province, and apace unfold to different provinces of China and different countries. The World Health Organization declared that the outbreaks of the novel coronavirus have deep seated a public health emergency of international concern. The 2019-nCoV was completely different from SARS-CoV, however, shared constant host receptor the human angiotensin-converting enzyme 2 (ACE2). The natural host of 2019-nCoV could also be the bat *Rhinolophus affinis* as 2019-nCoV showed 96.2% of whole-genome identity to BatCoV RaTG13. 2019-nCoV has been recognized in 34 countries, with a complete of 80,239 laboratory-confirmed cases and 2,700 deaths. The dental practitioners expose to tremendous risk of 2019-nCoV infection because of the face-to-face communication and also the exposure to saliva, blood, and different body fluids, and also the handling of sharp instruments. Because of the characteristics of dental settings, the chance of cross infection are often high. Dental professionals play great roles in preventing the transmission of 2019-nCoV. This clinical review, supported the expertise, relevant guidelines and analysis, introduces essential data concerning 2019-nCoV and nosocomial infection in dental settings and provides counselled management protocols for dental practitioners.

**Keywords:** Nosocomial Infection; Transmission; Dental Public Health; Practice Management

### Abbreviations

SARS-CoV: SARS Coronavirus; (019-nCoV: Novel Coronavirus Disease 2019

### Introduction

The coronavirus occurrence could be a international concern. With every passing day matters appear to alter the worst. More and more people are confirmed as infected, the mortality rate goes up slightly with every fatal case and therefore the virus is creating its manner outside the Chinese borders. An emergent pneumonia outbreak originated in Wuhan City, in the late December 2019 [1]. The pneumonia infection has quickly unfold from Wuhan to most different provinces and other 24 countries [2]. WHO declared a public health emergency of international concern over this global pneumonia outbreak on 30<sup>th</sup> January 2020. The typical clinical symptoms of the patients who suffered from the novel viral pneumonia were fever, cough, and myalgia or fatigue with abnormal chest CT, and the less common symptoms were sputum production, headache, hemoptysis and diarrhea [3]. This new infectious agent is additional seemingly to have

an effect on older males to cause severe respiratory diseases [4]. A number of the clinical symptoms were completely different from the severe acute respiratory syndrome (SARS) caused by SARS coronavirus (SARS-CoV) that happened in 2002–3, indicating that a new person-to-person transmission infectious agent has caused this emergent viral pneumonia outbreak [5]. The infectious agent of this viral pneumonia happening in Wuhan was finally identified as a novel coronavirus (2019-nCoV), the seventh member of the family of coronaviruses that infect humans [6]. On 11<sup>th</sup> February 2020, WHO named the novel viral pneumonia as “Corona Virus Disease (COVID19)”, whereas 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 [7]. Due to the characteristics of dental settings, the danger of nosocomial infection could also be high between dental practitioners and patients. For dental practices and hospitals in countries/regions that are potentially affected with COVID-19, strict and effective infection management protocols are urgently needed. This clinical review, supported the expertise, relevant guidelines and analysis, introduces essential data concerning COVID-19 and nosocomial infection in dental settings and provides counselled management protocols for dental practitioners.

### The origin of the coronavirus

Pathogens named after their peculiar crown-like spikes, there are many types, most of that infect animals and not humans but some evolved spreading to humans, turning into human coronaviruses. There are seven types of human coronaviruses that we all know of coronavirus contains of an oversized family of viruses that are common in human beings additionally animals (camels, cattle, cats, and bats). There are seven different strains of corona virus [8]:

1. 229E (alpha coronavirus)
2. NL63 (alpha coronavirus)
3. OC43 (beta coronavirus)
4. HKU1 (beta coronavirus)
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)
6. SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS)
7. SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-19).

Sometimes, coronavirus from animals infect people and spread further via human to human transmission such as with MERS-CoV, SARS-CoV, and now with this COVID 19 (Corona disease 2019). The virus that causes COVID-19 is selected severe acute respiratory syndrome corona virus 2 (SARS-CoV-2); previously, antecedent, mentioned as 2019-nCoV.

### Spread

When people unexposed to the animal market started getting sick, it was confirmed that the virus could spread from human to human. Much like the common cold, it spreads through airborne particles, surface particles, and close contact with infected individuals. Since it was concluded that the novel coronavirus could spread from person-to-person.

According to the WHO situational report from January 30, 2020, there are:

- 80,000 confirmed cases in China
- 608 confirmed cases in South Korea
- 152 confirmed cases in Japan
- 140 confirmed cases in Italy

- 89 confirmed cases in Singapore
- 74 confirmed cases in Hong Kong
- 43 confirmed cases in Iran
- 35 confirmed cases in the Thailand
- 35 confirmed cases in United States of America
- 28 confirmed cases in Taiwan
- 22 confirmed cases in Australia, Malaysia
- 16 confirmed cases in Germany, Vietnam
- 13 confirmed cases in United Arab Emirates
- 12 confirmed cases in France
- Less than 10 in Macau, UK, Canada, India Philippines, Russia, Spain, Belgium, Cambodia, Egypt, Finland, Iraq, Israel, Lebanon, Nepal, Sri Lanka, Sweden.

Globally, there are a total of 28000 confirmed cases, with 27 countries outside of China being affected by the 2019-nCoV.

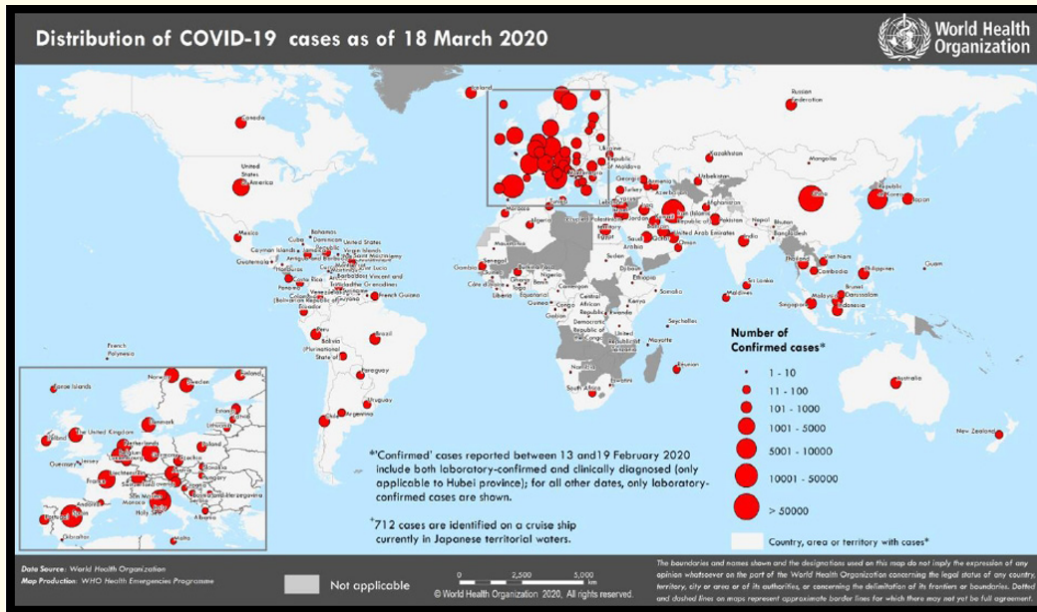
### **Busted myths concerning the coronavirus**

Even if the novel coronavirus has not been around for that long, there are already a bunch of uncertainties concerning the spread, treatment and nature of the virus.

1. The novel coronavirus solely affects older individuals: It has been proved that the novel coronavirus can infect individuals of all ages, but, like all viral infections, there are individuals with higher risks of contamination. Children, seniors, people with a compromised immune system, and people with health conditions such as diabetes, heart disease, kidney failure, liver disorders, asthma, lung disease, and other respiratory issues are vulnerable to becoming ill and developing severe forms of the disease.
2. Family pets will unfold the novel coronavirus: As of currently, there has been no case of family pets like cats and dogs changing into infected with the novel coronavirus. Therefore, there's no proof to keep a copy this claim.
3. We can prevent or treat the novel coronavirus with antibiotics: Antibiotics work against bacteria, whereas, the novel coronavirus is a virus. So, antibiotics can haven't any useful effects on coronavirus infections. However, those that are hospitalized for the novel coronavirus would possibly get antibiotics to treat bacterial coinfections. We can have a bacterial infection and viral infection at constant time.
4. We'll be able to forestall or treat the novel coronavirus with homeopathic remedies or alternative specific medications.
5. A surgical mask is enough to protect us from exposure to the coronavirus: Disposable surgical masks provide low protection against harmful particles. That's partly as a result of they're not tailored to the face, so airborne contamination can easily occur. However, that's conjointly because of them not being used as they should. The majority of people will use the same mask multiple times or take it off for a short period of time, then put it back on, or touch their mouths/noses while wearing the mask. There is also the fact that if we tamper with the mask and don't wash/disinfect our hands after, when we are helping the spread of harmful particles. But, if worn correctly, disposable surgical masks provide some protection (somewhere between 40-50%). For a safer choice, try N95 masks. These are fit tested masks made to perfectly seal off our mouth and nose, to attenuate contagion risks. However, the N95 can't be worn for extended periods as they constrict the amount of air we're obtaining.

**Epidemiology**

Since, the first reports of cases from Wuhan, at the end of 2019, more than 80,000 2019-nCoV cases have been reported in China; including all laboratory-confirmed cases as well as clinically diagnosed cases in the Hubei Province. The rate of new cases outside of China has outpaced the rate in China which led WHO to declare 2019-nCoV as a pandemic (Figure 1).



**Figure 1:** Countries, territories or areas with reported confirmed cases of COVID-19, 18 March 2020.

Updated till: March 21<sup>st</sup>, 2020

2019-nCoV Cases	Deaths	Recovered
2,77,049	11,422	91,986

**Understanding the COVID-19 epidemiology**

**Why protective measures matter needed?**

$R_0$  = No. of days affected people stay infectious x susceptible population x chance of infection

$R_0$  is the average number of people that an infected person transmits the virus to.

If  $R_0$  is <1, the epidemic will burn out.

If  $R_0$  = 1, then epidemic will continue at a steady pace.

If  $R_0$  >1, the epidemic will increase exponentially.

Since 80% people would be asymptomatic, infection based isolation is not going to work.

Stigma against COVID-19 is problematic as it fails isolation and treatment measures, jeopardising the patient as well as population health.

### Symptoms and its clinical manifestation

#### Incubation period

The exact incubation period is not known. It is presumed to be between 2 to 14 days after exposure, with most cases occurring within 5 days after exposure [9].

#### The spectrum of illness severity

Most infections are self limiting. 2019-nCoV tends to cause more severe illness in elderly population or in patients with underlying medical problems.

Infections with an estimation of disease severity [10]:

1. Mild illness was reported in 81% patients.
2. Severe illness (Hypoxemia, > 50% lung involvement on imaging within 24 to 48 hours) in 14%.
3. Critical Disease (Respiratory failure, shock, multi-organ dysfunction syndrome) was reported in 5 percent.
4. Overall case fatality rate was between 2.3 to 5%.

#### Age affected

- Mostly middle aged (> 30 years) and elderly.
- Symptomatic infection in children appears to be uncommon, and when it occurs, it is usually mild.

#### Clinical presentation

In a study describing 1099 patients with COVID-19 pneumonia in Wuhan, the most common clinical features at the onset of illness were [10]:

1. Fever in 88%
2. Fatigue in 38%
3. Dry cough in 67%
4. Myalgias in 14.9%
5. Dyspnea in 18.7%.

Pneumonia appears to be the most common and severe manifestation of infection. In this group of patients breathing difficulty developed after a median of five days of illness. Acute respiratory distress syndrome developed.

#### Other symptoms

1. Headache
2. Sore throat
3. Rhinorrhea
4. Gastrointestinal symptoms

- About 80% of confirmed COVID-19 cases suffer from only mild to moderate disease and nearly 13% have severe disease (dyspnea, respiratory frequency  $\geq 30$ /minute, blood oxygen saturation  $\leq 93\%$ ,  $\text{PaO}_2/\text{FiO}_2$  ratio  $<300$ , and/or lung infiltrates  $> 50\%$  of the lung field within 24 - 48 hours).
- Critical illness (respiratory failure, septic shock, and/or multiple organ dysfunction/failure) is noted in only in less than 6% of cases.

### COVID-19 in pediatric population

In this outbreak, compared with adult cases, there are relatively fewer cases of children, milder symptoms and better prognosis. Also, children are less frequently exposed to the main sources of transmission. Most infected children recover one to two weeks after the onset of symptoms, and no deaths had been reported by February 2020.

According to the recent report of the China-WHO Joint Mission Expert Group, the current domestic case data show that children under 18 years of age account for 2.4% of all reported cases, and no deaths have been reported [11].

### Probable reasons why COVID-19 is less affected in children

- The humoral and cellular immune development in children is not fully developed. This may be one of the mechanisms that lead to the absence of severe immune responses after viral infection.
- As COVID-19 virus exploits the ACE2 receptors to gain entry inside the cells, under expression, immaturity of ACE2 receptors in children is another hypothesis in this regard.
- Moreover, recurrent exposure to viruses like respiratory syncytial virus in winters can induce more immunoglobulins levels against the new virus infection compare to adults. There is no direct evidence of vertical mother-to-child transmission, but new borns can be infected through close contact.

### The possible transmission routes of 2019-NCOV

The common transmission routes of novel coronavirus include direct transmission (cough, sneeze, and droplet inhalation transmission) and contact transmission (contact with oral, nasal, and eye mucous membranes) [12].

- 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 [13].
- Studies have suggested that 2019-nCoV may be airborne through aerosols formed during medical procedures. However, the aerosol transmission route and the fecal-oral transmission route concerned by the public still need to be further studied and confirmed.

### Possible transmission routes of 2019-NCOV in dental clinics

Since, 2019-nCoV can be passed directly from person to person by respiratory droplets, rising proof prompt that it's going to even be transmitted through contact and fomites [14]. Additionally, the asymptomatic incubation period for individuals infected with 2019-nCoV has been reported to be 1 -14 days, and after 24 days individuals were reported, and it had been confirmed that those while not symptoms will unfold the virus [15]. Furthermore, it's been confirmed that 2019-nCov enters the cell in the same path as SARS coronavirus, that is, through the ACE2 cell receptor [16]. 2019-nCoV will effectively use ACE2 as a receptor to invade cells, which might promote human-

to-human transmission [17]. ACE2+ cells were found to be abundantly present throughout the respiratory tract, additionally because the cells morphologically compatible with salivary gland duct epithelium in human mouth.

Dental patients and professionals are often exposed to pathogenic microorganisms, including viruses and bacteria that infect the oral cavity and respiratory tract. Dental care settings invariably carry the risk of 2019-nCoV infection because of specificity of its procedures, that involves face-to-face communication with patients, and frequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. The pathogenic microorganisms are often transmitted in dental settings through inhalation of airborne microorganisms that can remain suspended in the air for long periods [18], direct contact with blood, oral fluids, or other patient materials [19], 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 [20,21], and indirect contact with contaminated instruments and/or environmental surfaces [22]. Infections could be present through any of these conditions concerned in an infected individual in dental clinics and hospitals, significantly throughout the incidence of 2019-nCoV (Figure 2).

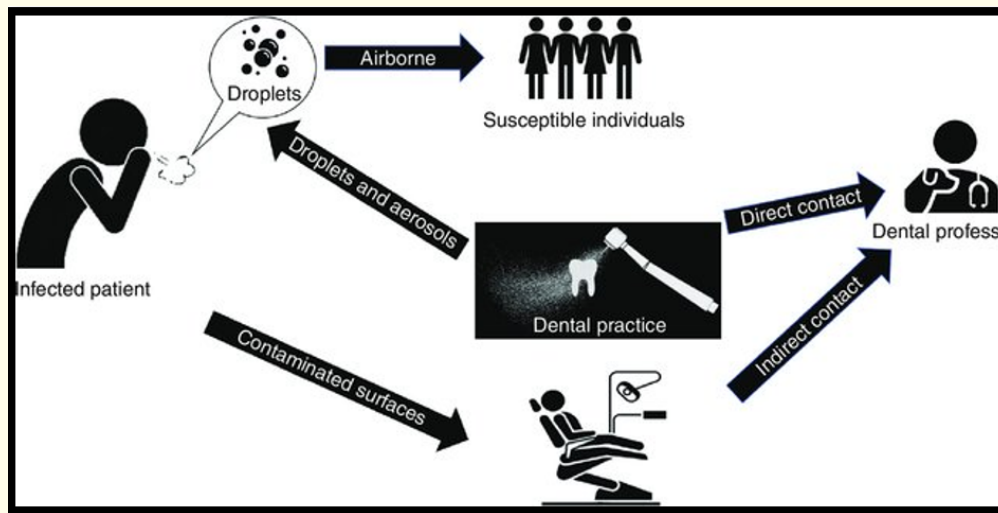


Figure 2: Illustration of transmission routes of 2019-nCoV in dental clinics and hospitals.

**Transmission routes of 2019-Ncov in dental clinics and hospitals are:**

1. Airborne spread
2. Contact spread
3. Contaminated surfaces spread.

**Infection controls for dental practice**

Dental professionals should be familiar with how 2019-nCoV is spread, how to identify patients with 2019-nCoV infection, and what extra-protective measures should be adopted during the practice, in order to prevent the transmission of 2019-nCoV. Here, we recommend the infection control measures that should be followed by dental professionals, particularly considering the fact that aerosols and droplets were considered as the main spread routes of 2019-nCoV.



Our recommendations are based on the Guideline for the Diagnosis and Treatment of Novel Coronavirus Pneumonia (the 5<sup>th</sup> edition), the Guideline for the Prevention and Control of Novel Coronavirus Pneumonia in Medical Institutes (the 1<sup>st</sup> edition), and the Guideline for the Use of Medical Protective Equipment in the Prevention and Control of Novel Coronavirus Pneumonia released by the National Health Commission of the People’s Republic of China, and the practice experience in West China Hospital of Stomatology related to the outbreak of 2019-nCoV transmission.

**Patient evaluation:** First of all, dental professionals should be able to identify a suspected case of COVID-19 (Figure 3).

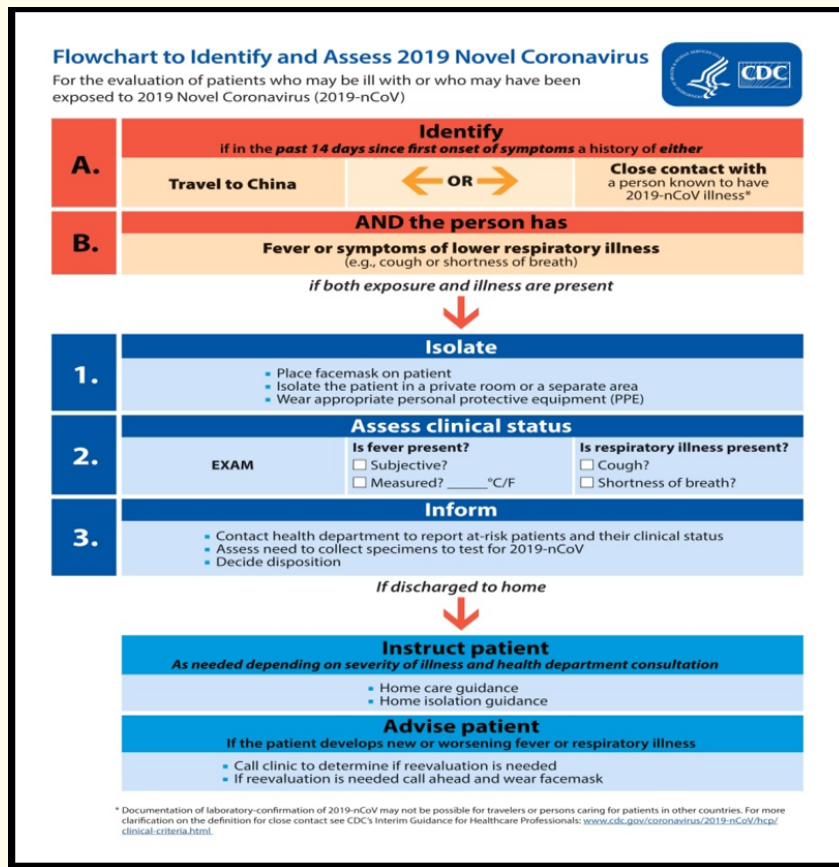


Figure 3: Flowchart to identify and assess 2019-nCoV.

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.

**Hand hygiene for dental practice:** Wash hands with soap and water for at least 20 seconds after contact with patients or use an alcohol-based hand sanitizer with at least 60% alcohol if soap and water are not available (Figure 4).



- (1) Do you have fever or experience fever within the past 14 days?
- (2) Have you experienced a recent onset of respiratory problems, such as a cough or difficulty in breathing within the past 14 days?
- (3) Have you, within the past 14 days, travelled to Wuhan city and its surrounding areas, or visited the neighbourhood with documented 2019-nCoV transmission?
- (4) Have you come into contact with a patient with confirmed 2019-nCoV infection within the past 14 days?
- (5) Have you come into contact with people who come from Wuhan city and its surrounding areas, or people from the neighbourhood with recent documented fever or respiratory problems within the past 14 days?
- (6) Are there at least two people with documented experience of fever or respiratory problems within the last 14 days having close contact with you?
- (7) Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?

Table 2



Figure 4: Hand-washing steps using the WHO technique.

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

- (1) 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.
- (2) 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.
- (3) Tertiary protection (strengthened protection when contact patient with suspected or 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, special protective outwear is needed. If protective outwear is not available, working clothes (white coat) with extra disposable protective clothing outside should be worn. In addition, disposable doctor cap, protective goggles, face shield, disposable surgical mask, disposable latex gloves, and impermeable shoe cover should be worn.

Mouthrinse before dental procedures.

Rubber dam isolation.

**Anti-retraction handpiece:** The high-speed dental handpiece without anti-retraction valves may aspirate and expel the debris and fluids during the dental procedures. More importantly, the microbes, including bacteria and virus, may further contaminate the air and water tubes within the dental unit, and thus can potentially cause cross-infection. Studies has shown that 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 [23].

Therefore, the use of dental handpieces without anti-retraction function should be prohibited during the epidemic period of COVID-19. Anti-retraction dental handpiece with specially designed anti-retractive valves or other anti-reflux designs are strongly recommended as an extra preventive measure for crossinfection [24]. Therefore, the use of dental handpieces without antiretraction function should be prohibited during the epidemic period of COVID-19.

**Disinfection of the clinic settings:** Medical institutions should take effective and strict disinfection measures in both clinic settings and public area.

**Management of medical waste:** The medical waste (including disposable protective equipment after use) should be transported to the temporary storage area of the medical institute timely.

### Recommendations for dental education

Education-related challenges for medical and dental schools, as well as their affiliated hospitals, are significant. It was reported that open communication among students, clinical teachers, and administrative staff would enhance mutual trust and facilitate adequate cooperation [25].

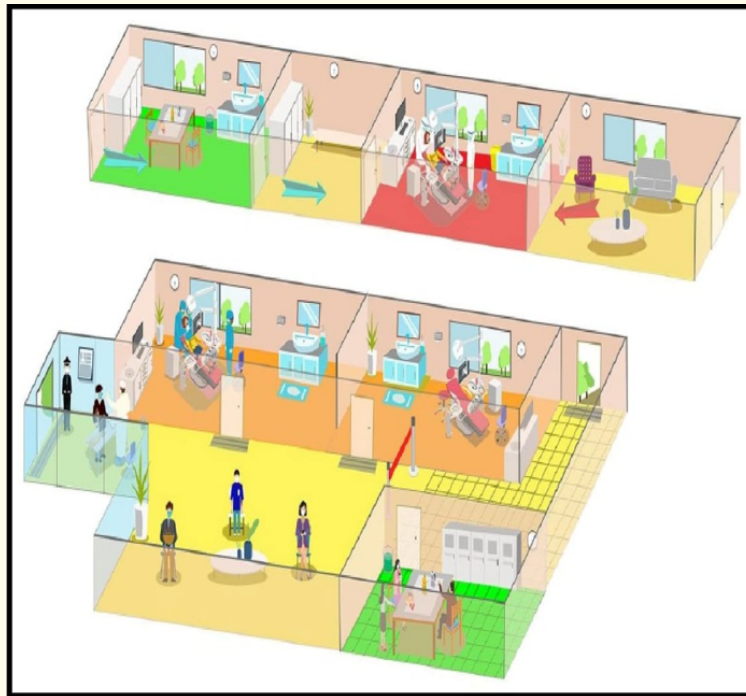
It's provide a few basic recommendations for dental education during an outbreak:

1. First, during the outbreak period, online lectures, case studies, and problem-based learning tutorials should be adopted to avoid unnecessary aggregation of people and associated risk of infection [26]. Existing smart devices and applications have already made it possible for dental students to listen to and review lectures whenever and wherever possible.

2. Second, it is worth advocating to encourage students to engage in self-learning, make full use of online resources, and learn about the latest academic developments.
3. Third, during this period, it is easy for students to be affected by disease-associated fear and pressure, and dental schools should be prepared to provide psychological services to those who need them [27]. With the increased knowledge of viral features, epidemiologic characteristics, clinical spectrum, and treatment, efficient strategies have been taken to prevent, control, and stop the spread of COVID-19.

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

As shown in the diagram, our triage staff in the yellow area wear disposable surgical mask, cap, and work clothes. In the orange area, dental staff is provided with PPE, including disposable N95 masks, gloves, gowns, cap, shoe cover, and goggles or face shield. The area is disinfected once every half day. All the patients were treated in this area. The isolation clinic in the red area was set up on February 21. It is designed for patients who are suspected with COVID-19, who are recovering from COVID-19 (but < 1 mo after they are discharged from hospital), or who need dental procedures producing droplets and/or aerosols. Separate entrances for patients (red arrow) and staff (blue arrow) are provided in the area. Dental staff should wear protective clothing besides the aforementioned PPE. In addition, the entire isolation area is disinfected immediately after the treatment is over and the patient has left. The grid area behind the red line is for staff only. Staff can have a rest in the room (green area). They are recommended to enter the room by turn and to keep wearing medical masks unless they are eating or drinking (Figure 5).



**Figure 5:** The personal protective equipment (PPE) diagram for divisions in the emergency care area at the School and Hospital of Stomatology, Wuhan University, during the coronavirus disease 2019-nCoV outbreak. Yellow: triage and waiting area. Orange: dental clinic. Red: isolation clinic. Green: resting area for staff only.

### Diagnosis

The infection with the novel coronavirus via a special laboratory test. It requires samples such as swabs from the throat or fluid from the lungs, and the testing can be done in public health laboratories. The process is called PCR testing, and it takes from 24 to 48 hours to get a definitive result.

People eligible for PCR testing need to fit specific criteria:

1. Individuals that have a sudden onset of fever, sore throat, cough or shortness of breath.
2. Individuals who have been exposed to the virus, 14 days before the onset of symptoms, by:
  - Traveling to China or regions in which the novel coronavirus is known to be transmitted from person to person (Hong Kong, Thailand, Japan, Singapore, etc.)
  - Being in contact with a person that has returned from China or a region with ongoing community transmission of the novel coronavirus.
  - Having close contact with a person that has the coronavirus either in a public place or at work or home.
  - Attending or working in a healthcare facility that has/had patients with the novel coronavirus.

### Treatment options - COVID 19

There is no specific antiviral treatment recommended for COVID-19, and no vaccine is currently available at time of writing this article [28].

### Mild disease

These patients usually present with symptoms of:

- An upper respiratory tract viral infection
- Low grade fever, cough, malaise, rhinorrhoea, sore throat without any warning signs
- Shortness of breath
- Haemoptysis
- Gastro-Intestinal symptoms: Nausea, vomiting, Diarrhea
- Without change in mental status (i.e. confusion, lethargy)
- Non immunocompromised

### Recommendation: Consider for home isolation in asymptomatic/mild disease

#### Who all needs admission in COVID-19?

##### Severe disease (14%)

- Respiratory rate > 30/min
- $SPO_2$  < 93%
- $PaO_2/FiO_2$  < 300
- Lung infiltrates > 50% within 24 - 48 hours.

### Critically ill (5%)

- Respiratory failure (need of mechanical ventilation)
- Septic shock
- MODS.

### Is there a definitive therapy?

- No drug of choice
- Oxygen support
- Oxygen saturation to be maintained above 90%
- Conservative fluid management
- Give empirical antibiotics (As per institution based CAP guidelines)/anti-viral (Oseltamivir)
- High dependency/ICU care when needed.

### Anti-viral therapy

**No anti-viral therapy has been proven to work for COVID-19 in humans:** Multiple RCTs are ongoing; hopefully they will bring us further information soon [28].

### Whenever possible, patients should be enrolled in RCTs.

- Information is provided below about some of the more popular agents which are being used by some practitioners.
- A focus is placed on lopinavir/ritonavir and chloroquine since these agents are currently available.
- Practitioners are encouraged to review available evidence and reach their own conclusions regarding whether to use these medications.

### Other available treatment options

#### ACE inhibitors (ACEi)/Angiotensin receptor blockers (ARBs)

- Off late there is lot of interest in the potential role of ACE-inhibitors (ACEi)/angiotensin receptor blockers (ARBs) in the pathophysiology of this disease since the SARS-CoV-2 virus binds to the ACE2 receptor for cellular entry.
- Theoretically it can be blocked by ARBs.
- But ACE2 is a negative regulator of RAS (It inactivates angiotensin 2), hence the suggestion might be counterintuitive.
- ACE (CD143) appears on the macrophage plasma membrane during activation.

### Anti bacterial therapy

#### Initial empirical antibiotics [28]

- COVID-19 itself is not an indication to start antibiotics.
- However antibiotics can be initiated to treat secondary bacterial pneumonia.
- Broad spectrum antibiotics to be initiated according to the institution based guidelines.

### Delayed bacterial super infection [28]

- Bacterial pneumonia can emerge during the hospital course (especially d) ventilator-associated pneumonia in patients who are incubated).
- This may be investigated and treated similarly to other ventilator-associated pneumonias, or hospital-acquired pneumonias.

### Other agents

- Baricitinib Darunavir/Cobicistat
- Umifenovir (Arbidol)- 200 mg TDS
- Favilavir- first approved drug in china
- Galidesivir
- Leronlimab
- Brilacidin
- Combination of monoclonal antibody
- Traditional medicines in different countries 75AF.

### What we can adopt for treatment?

- Patient to be classified as mild/severe/critical
- Decide whether he/she requires only home isolation
- Assess oxygenation on room air
- Consider referral to a nodal centre if requiring admission
- Home care advise in mild/asymptomatic cases.

### COVID-19 management

The following treatment plan is suggested on the on the basis of information available till date on various investigational treatment approaches (Figure 6 and 7).

### Critical care management of icu patients and those who need mechanical ventilation

#### Role of non-invasive positive pressure ventilation (NIPPV):

- NIPPV have Limited role as patients are usually very much tachypneic/hypoxic and starting and maintaining NIPPV with frequent interruption by patient may cause more aerosolization of the virus with the consequent risk to medical personal.
- Avoid high flow Nasal Oxygen (HFNO) or NIPPV for the above mentioned reasons unless individualized patient's related factors exists such as (e.g. COPD, Do Not Incubate/Do Not Resuscitate status etc [29]).
- If use of NIPPV cannot be avoided (less ICU beds / or non-availability of mechanical ventilator then use NIPPV with helmet mask interface (Preferred).
- Ventilation Strategy: Manage as per ventilator management in ARDS NET protocol (Figure 8).

SEVERITY OF ILLNESS	PLAN
<b>Mild illness</b> without any risk factors/ Co-morbidities	<ul style="list-style-type: none"> <li>• Outpatient care</li> <li>• Strict Home Quarantine monitored by government/health authorities</li> <li>• Supportive care</li> <li>• Assess patient's clinical condition via telephonic conversation/ using telemedicine facility</li> </ul>
<b>Moderate illness:</b> <ul style="list-style-type: none"> <li>• Dyspnoea</li> <li>• Hypoxemia</li> <li>• Infiltrates/ consolidation on chest xray/ CT scan</li> </ul>	<ul style="list-style-type: none"> <li>• Admit in Hospital isolation room</li> <li>• Supportive care</li> <li>• Start empirical antibiotics as per local community acquired pneumonia treatment guidelines</li> <li>• Oseltamivir 75/150mg BD</li> <li>• Consider starting Hydroxychloroquine Or Lopinavir/Ritonavir (if evident risk factors for progression of disease are present)</li> </ul>
<b>Critical illness:</b> <ul style="list-style-type: none"> <li>• Mechanically ventilated patient's</li> <li>• Multi lobar/ bilateral lung consolidation</li> </ul> <i>Careful using these drugs in patients with multi organ damage</i>	<ul style="list-style-type: none"> <li>• Remdesivir (for compassionate use only)</li> <li>• <b>Tocilizumab</b> can be considered (check IL-6 level prior to starting Tocilizumab). Especially in patients with evidence of cytokine release syndrome</li> <li>• Continue IV antibiotics and supportive care</li> <li>• Rule out ventilator associated pneumonia/ catheter related infections and other secondary bacterial/viral/fungal infections</li> <li>• Always keep in mind the to rule out differentials of non-resolving pneumonia</li> <li>• In ventilated patients: follow ARDS NET protocol strategy</li> <li>• Consider ECMO if need arises</li> <li>• Refractory or progressive cases in ICU: Interferon beta B1 can be considered. However it should be combined with an anti-viral (Lopinavir/Ritonavir) and hydroxychloroquine</li> </ul>

Figure 6

Agent	Classification	Mechanism of action	Dosage	Side effects
Hydroxychloroquine	Off label use	Hampers low PH dependant steps of viral replication	400 mg BID x 2 doses, then 200 mg BID for 5 days	QT prolongation
Oseltamivir	No trials on COVID-19	Neuraminidase enzyme inhibitor in influenza	150mg BID for 5 days	GI intolerance Headache Insomnia
Remdesivir	Investigational (can be used only on compassionate basis)	RNA dependent RNA polymerase inhibitor	200 mg IV loading dose, then 100 mg IV daily, up to 10 days	GI intolerance Hepatotoxicity
Lopinavir/Ritonavir	Off label use	3CLpro (viral protease) inhibitor	400/100 mg BID for up to 10 days	QT prolongation Hepatotoxicity
Ribavirin	Off label use	Inhibitor of RNA polymerization	2 grams (loading dose) then 600mg TID	High risk of toxicity Boned warning for haemolytic anaemia
Interferon Beta B1	Off label use	Immunomodulatory, enhancement of innate and adaptive viral immunity	-	Flu like syndrome depression
Tocilizumab	Off label use	Monoclonal antibody to IL6 receptor / treats cytokine release syndrome	-	Elevation of liver enzymes Increased risk of re-activation of other Respiratory infections
Antibiotics (Broad spectrum)	Initiate as per institution based CAP/VAP policy	Secondary bacterial infection (CAP)/VAP	-	-
Corticosteroids	Not indicated in treating SARS CoV2 as per available evidence. Might prolong viral shedding. Use as per indicated in septic shock/ if patient has other indications for steroid use			
IV Immunoglobulin (IVIg)	Off label use	Antibodies from convalescent plasma might suppress viraemia.  Theoretically: Better to start at early stage of disease	Consider IVIG at standard dose of 1 gm/kg daily x 2 doses	Might interact with antivirals

Figure 7



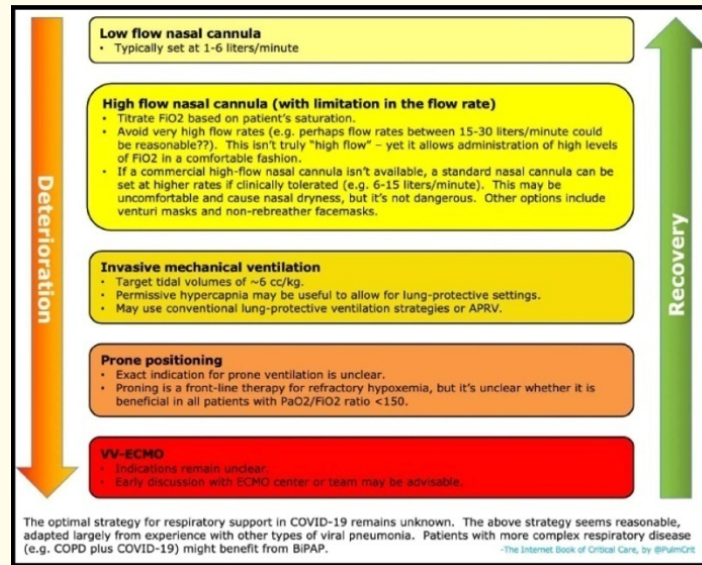


Figure 8

**Risk of viral shedding**

- Exact dynamics unknown
- First COVID 19 case was detected in USA on the 4 of patient’s illness. It is suggestive of high viral loads and potential for transmissibility. They also detected 2019-nCoV RNA in a stool specimen collected on day 7 of the patient’s illness [30].
- However, extra pulmonary detection of viral RNA does not necessarily mean that infectious virus is present, and the clinical significance of the detection of viral RNA outside the respiratory tract is unknown at this time.
- As a precautionary measure treated/isolated patient should be discharged only after 2 samples are negative (more than 24 hours apart).

**When to discharge patient**

- Resolution of symptoms
- Radiological improvement
- Documented virological clearance in 2 samples at least 24 hours apart.

**Prognostic factors**

**General prognosis [31]**

The vast majority of infected patients (e.g. > 80%) don’t get significantly ill and don’t require hospitalization.

- Among hospitalized patients (Guan., *et al.* 2/28)
- 10 - 20% of patients are admitted to ICU.
- 3 - 10% requires intubation.
- 2 - 5% dies.

Longer term outcomes: Prolonged ventilator stay? As the epidemic progresses, an issue which may arise is a large volume of patients unable to wean from mechanical ventilation.

### Epidemiological risk factors

- Older age
- Male sex
- Medical co-morbidities
- Chronic pulmonary diseases
- Cardiovascular disease
- Chronic kidney disease
- Diabetes

### Practical advice to protect ourself and our family

According to the WHO social distancing won't stop accelerating coronavirus pandemic. It's mentioned before that the coronavirus spreads like a common cold, so there are many similarities regarding prevention measures, but there are also plenty of differences. In this review, It will cover both basic prevention measures and specific ones, as well as safety tips for people that travel frequently.

### Common prevention measures

- Clean our hands frequently, either by washing them with soap and water (for at least 20 seconds) or using an alcohol-based (with at least 60% alcohol) hand sanitizer (when the hands are not visibly dirty).
- To protect ourself and others, you should always wash our hands: after using the toilet; after handling pets or their waste; before, during and after cooking; before eating and setting the table; after sneezing or coughing and last but not least, wash our hands frequently as possible.
- Cover our mouth and nose with your elbow if you want to sneeze/cough or, preferably, do it in a tissue. Dispose of the tissue immediately in a closed bin.
- Avoid touching the eyes, nose, and mouth with our hands. They have mucous membranes that can act as pathways for particles, and our hands are the primary carrier of those harmful particles.
- Clean common areas such as public bathrooms, workplace, or any space in which many people are gathered, before settling in.
- Avoid being in direct contact with people that sneeze or cough. Try to maintain a distance of about 6 feet (that is how far the particles can travel) between us and them. This goes the other way too, stay away from crowded places and avoid contact with people if we are experiencing these symptoms.
- Frequently wipe your phone (especially the screen) with an alcohol based disinfectant.
- Don't spit in public.
- If we are sick, stay at home as much as possible. It decreases the viral load and the risk of spreading, and it's making your community a safer space for others.

### Prevention measures specific to the coronavirus

- Avoid traveling to China or Wuhan if possible.
- If we were/are in China or you were in contact with someone from China/that visited China in the last two weeks, and we start experiencing symptoms call our health provider immediately.
- Use a different cutting board and knife for raw meat and wash our hands after handling it.
- Make sure that the meat we are eating was properly handled and cooked.
- If we work in a Chinese wet market, wear protection gowns (with gloves and a mask) that we wash on a daily basis. Avoid exposing any family members to our work clothes. Also, make sure to frequently (at least once a day) disinfect our working area and equipment.

### Travelling advice

- Avoid travelling at all while sick.
- Avoid getting in contact with sick animals, or travelling with sick animals.
- Make sure that we only eat well-cooked food. Avoid any raw product, especially meat.
- Avoid contact with sick people; frequently wash/disinfect our hands and don't touch our eyes, mouth, or nose.
- If we wear a surgical mask, make sure that it covers both our nose and our mouth and avoid touching it while it's on. Discard the mask after use and wash our hand thoroughly.
- If we start experiencing troubling symptoms while travelling, inform the crew, or seek medical care. Make sure that we share our travelling information with the health care provider.
- Children, senior citizens, and people that have a compromised immune system have a higher risk of getting infected. Try to educate them regarding safety measures and care for them as much as possible.

### Future perspective in dental practice

What should we do to improve the current infection prevention and control strategies after the epidemic? How should we respond to similar contagious diseases in the future? These are open questions in need of further discussion and research.

We have a tendency to should be perpetually responsive to infectious threats which will challenge the current infection control regimen, particularly in dental practices. The novel coronavirus could be scary currently, however in a very few months, we'll have ways that to notice it in early stages, higher treatment options and efficient prevention methods (vaccines) to keep us safe.

### Conclusion

The mere mention of the novel coronavirus causes panic and anxiety to turn out. However, this panic doesn't come back from the severity of the virus or its mortality rate, but from the actual fact that it's an unknown pathogen with a hidden agenda. Despite scientific proof that majority of the cases are mild, with symptoms that disappear on their own, we choose to focus on the few severe cases that led to serious health conditions and death. It's perfectly normal to be in tune to our surroundings. If we wish to guard ourself and people we tend to love, follow sensible hygiene habits. Frequently washing our hands minimizes the possibilities of spreading virus particles or putting ourself in contact with harmful pathogens. Avoiding crowded areas or contact with sick individuals and staying at home when we

show any symptoms can make sure the safety of our community. Most prevention measures are pretty common to viral infections, and that they do not need a lot of effort to implement in our daily life. Until then, being alert is that the best we will do to protect ourself and our family. Keep calm and do not like the overall sense of panic and anxiety that news reports preach.

Stay connected to regular CDC and WHO updates that focus on the truth and are overall higher sources of knowledge.

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The author was contributed to update all relevant information to formulate the design, drafted the manuscript review. The author gave final approval and agree to be accountable for all aspects of the work.

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### Conflicts of Interest

There are no conflicts of interest.

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