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COVID-19 and dental practice

What has been done in China?

WHOCC CHN26

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Abstract

The Corona Virus Disease 2019 (COVID-19) pandemic brings great challenges to global public health. With consistent effort over the past few months, COVID-19 has been controlled to an acceptable level in China. Oral healthcare service is one of the most highly exposed clinical departments to respiratory tract pathogens due to the potential aerosol transmission risk. Therefore, stomatological hospitals and dental clinics in China have taken serious disease control and prevention. WHOCC CHN26 has collected anti-COVID-19 experience and knowledge in dental settings in China and to share with global colleagues in this critical time, hope to provide technical advice on the disease prevention and control in dental settings.

Introduction

The Corona Virus Disease 2019 (COVID-19) pandemic brings great challenges to global public health. Crisis management in emergent public

health event is a global problem, oral healthcare service is one of the most highly exposed clinical department to respiratory tract pathogens due to the potential aerosol transmission risk^{1,2}. Therefore, stomatological hospitals and dental clinics in China has taken serious disease control and prevention. This report generated by WHOCC CHN-26 aims to summarize current evidence and experience on how stomatological hospitals and dental clinics responded to this pandemic in China, including government policies, disease prevention and control in dental practice, and other aspects in dentistry. With sharing these experience, WHOCC CHN-26 hope to provide technical advices and suggestions to oral healthcare colleagues worldwide in dealing with this global public health emergencies as well as taken care patients dental needs.

Government policies and shutting down mode

From the beginning of the disease control, the National Health Commission of China added COVID-19 to the category of group B infectious diseases, which includes SARS and highly pathogenic avian influenza. However, it also suggested that all health care workers use protection measures similar to those indicated for group A infections — a category reserved for extremely infectious pathogens, such as cholera and plague².

Since then, in most cities of the mainland of China, only dental emergency cases have been treated when strict implementation of infection prevention and control measures are recommended. Routine dental practices have been suspended until further notification according to the situation of epidemics³. From the beginning of the restricted control till late march, only dental emergencies were taken care in the dental clinic and stomatological hospitals. Most of the non-emergency cases were postponed and partly recovered till early April. In some provinces with low risk and good control, infection control

and prevention procedure were under review by the local authorities and clinical operations without generating aerosols has been granted by the local health department.

During this critical time, Chinese Stomalogical Association (CSA) has played a leading role in collecting and disseminating latest policies, knowledge and news related to oral healthcare professionals⁴. CSA has organized and published Chinese and English articles on expert advices to clinical prevention and control and guidance to general public on preventing various oral diseases⁵⁻¹². CSA and China Oral Health Foundation have generated millions of funding and protective equipment to dental institutions in Hubei province^{4,13}. **Experts in WHOCC CHN-26 have participated all these activities.**

What are the appropriate clinical and non-clinical precautions and procedures should be taken to protect the patient and all staff in dental care services and minimize risk of contamination?

Dental operation produces splatter, droplet and aerosol which potentially cause disease mainly by contact and droplets transmission (Fig 1) . Efficient infection control can prevent the virus from further spreading, which helps to make the epidemic situation under control¹⁴⁻¹⁸.

Fig. 1

From: Transmission routes of 2019-nCoV and controls in dental practice

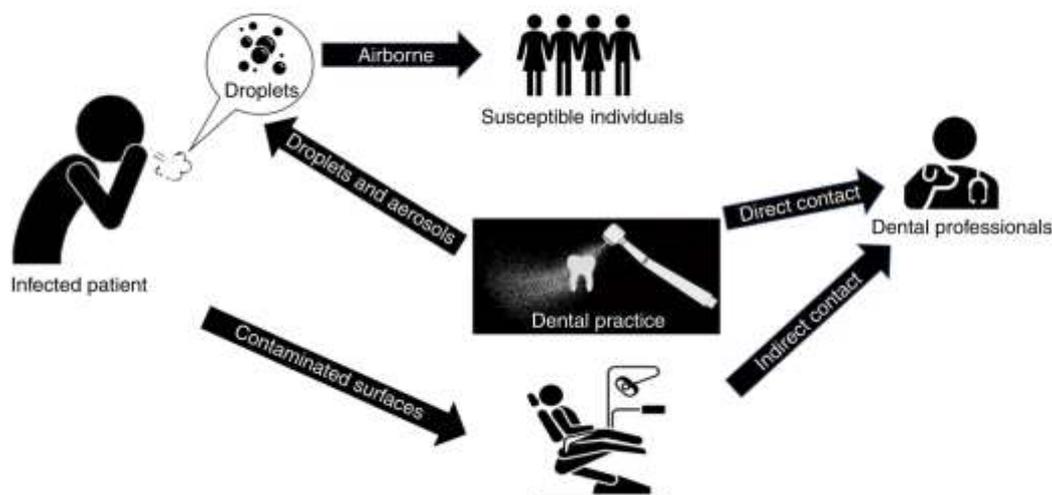


Illustration of transmission routes of 2019-nCoV in dental clinics and hospitals

Nonclinical precautions and procedures

a. Information updates and release: Dental institutions shall, in accordance with the management requirements of the national administrative department, pay close attention to the epidemic situation announcements issued by the government and the health administration departments, carry out external information release in coordination with the policies, and provide dental medical services while performing disease prevention and control.

b. Avoid unnecessary gathering and keep social distance: It is required to strengthen the organizational management, formulate relevant plans, regimes and process guidelines for the prevention and control of COVID-19, carry out training for all staff on prevention and disease control knowledge, and promote awareness, particularly amongst healthcare personnel, administrative and logistic support, security personnel, cleaning personnel, etc., avoid crowd gathering in public places, reduce and shorten meetings, suggest to organize meetings or training by video, network and other means.

c. Keep healthcare personnel's knowledge updated: All healthcare personnel must take training to the latest version of the COVID-19 diagnosis and treatment procedure. Healthcare personnel's health status must be closely monitored. It is also needed to formulate the system of duty arrangement for healthcare personnel, and manage the healthcare personnel with symptoms and epidemiological history according to local treatment guidelines, arrange the work of the medical personnel in a reasonable way, avoid overwork, carry out the health status and epidemiological monitoring among healthcare personnel.

Clinical precautions and procedures

d. The pre-examination triage system for screening diseases and treatment need: The pre-examination triage system shall be strictly implemented to ensure early detection, early reporting, early isolation and early treatment, and sufficient protective equipment and disinfectants shall be prepared in compliance with the national standards.

e. Strictly carry enhanced prevention protocol in dental practices: Healthcare personnel are required to strictly carry out standard prevention, and to perform the hospital infection control protocol such as personal protection, hand hygiene, management of the clinic room, ventilation, environment surface cleaning and disinfection, instruments reprocessing and waste control during the dental practice, so as to avoid healthcare associated infection.

f. Reserve emergency treatment only and postpone non-emergency treatment. Use online consultation and appointment reservation service. During the severe period of epidemic and in the outbreak areas, dental practice shall be determined in accordance with the requirements of the local health administration department and the center for disease control and

prevention, in combination of actual conditions of the dental institutions. Complete cessation of outpatient can be carried out, and only emergency treatment can be reserved (such as oral and maxillofacial trauma, oral space infection, acute pulpitis, temporomandibular joint dislocation, acute phase of pericoronitis, etc.), as well as other dental departments. It is recommended to make full use of online social network public accounts for the publicity. Patients are advised to carefully arrange medical treatment plans and postpone non-emergency treatment. Meanwhile, online consultation and appointment reservation service can also be provided.

g. In emergency service, spray equipment should be avoided and measures to reduce droplets and potential bioaerosol pollution. During dental practice, a large quantity of droplets and aerosols can be produced through the oral power device from patients' saliva, blood and secretions, which pose high risk of disease transmission between doctors and patients and between patients. Spray equipment such as rapid turbines and ultrasonic tooth cleaning machines should be avoided or be minimized during the disease epidemic. It is better to use auxiliary equipment such as rubber barrier and high volume suction to reduce droplets and potential bioaerosol pollution.

What are the Infection Prevention and Control Guidance for Dental Settings during the COVID-19 response?

Cleaning and disinfection of the pre-examination triage point¹⁸

The triage table and forehead thermometer should be kept clean. It is required to clean and disinfect the triage table and forehead thermometer every two hours or at any time in case of contamination. It is recommended to use 75% alcohol or disinfection wipes (containing the effective ingredients against 2019-nCoV) or chlorine disinfectant (500 mg/L effective chlorine content) to wipe and disinfect. If the suspected patient has been referred, the quarantine point should be cleaned and disinfected in time and registered.

Cleaning and disinfection of Outpatient Setting¹⁸

Settings of the clinic room: In principle, it is required to use an independent or relatively independent treatment unit. If spatter exists during practice, it should be performed in an independent room. All items irrelevant to the treatment should be removed or put into the cabinet and the surface should be neat to facilitate the disinfection. During the practice, it should maintain airflow and make fresh air infuse ceaselessly indoor by opening a window or using air purification device.

Patient management: Healthcare personnel should monitor patient's temperature, symptoms and relevant epidemiological history before treatment. At the beginning of treatment, the patient should be asked to gargle with mouthwash. It is recommended to avoid using or not to use the spittoon. Instead, it is needed to instruct the patient to cover mouth with the disposable mouthwash cup and then spit mouthwash into the cup, then the nurse should immediately use strong suction to reduce the generation of droplets and aerosols.

Personal protection for healthcare personnel: During the epidemic of COVID-19, healthcare personnel should first strictly implement standard

prevention. In order to better prevent the risk of transmission through droplets and contact during dental treatment, and to ensure the safety of doctors and patients, healthcare personnel should add additional preventive measures on the basis of standard prevention during treatment, such as the application of goggles, isolation suits and double gloves.

- 1)** When performing non-invasive and non-splash general treatment, disposable hats, surgical masks, disposable latex gloves, goggles and work clothes should be worn, and the isolation suits could be added.
- 2)** For splash operation, disposable hats, surgical masks or surgical protective masks (N95, N99, etc.), disposable latex gloves, goggles and/or protective face shields, work clothes and disposable isolation suits should be worn. Healthcare personnel should pay attention to the sequence of wearing and removing of personal protective equipment, and strictly implement hand hygiene in the process. At the same time, it is recommended to register doctors, nurses and patients' information for two-way traceability.
- 3)** Medical protective masks should be tested for tightness after wearing. The duration of use of the mask is generally no more than 4 hours, and the replacement is needed in case of pollution or humidity at any time. It is recommended to dispose the mask after each patient. After each treatment, the goggles and protective face shield should be cleaned, disinfected and dried. It can be disinfected with 75% alcohol, 500 mg/L~1000 mg/L chlorine-containing disinfectant or disinfectant wipes which is effective against COVID-19.
- 4)** Protective equipment such as goggles, protective face shield, isolation suit and protective clothing shall be used in the dental unit (beside the dental chair) and shall be removed when leaving the room. When removing the protective equipment, the hands shall not touch the contaminated surface, handle it from inside to outside, and perform hand hygiene timely. Disposable items cannot be reused.

5) Supportive departments (radiology department, laboratory department, pathology department, etc.) should use protective equipment in a reasonable way, including surgical masks, disposable hats, goggles, isolation suits, gloves, etc. The radiology department shall reduce the shooting of the inner teeth and can use the panoramic film instead. When shooting the panoramic film, the technicians and patients shall wear masks all the time.

6) Hand hygiene of healthcare personnel shall be strictly implemented in accordance with the Hand Hygiene Code for Medical Personnel (upon Local Regulation: WST313-2019 in China). Do not touch mouth, nose, eyes, etc. with contaminated hands.

7) Occupational exposure shall be strictly treated in accordance with the Guidelines on Occupational Exposure Protection Against Blood-borne Pathogens (upon Local Regulation: GBZ/T213-2008 in China).

Cleaning and disinfection after treatment: After the treatment, the medical personnel shall remove all protective equipment in sequence and perform hand hygiene throughout the whole process; for those who are able to shower, it is recommended to change clothes, for those who do not have shower, it is recommended to wash hands and face before leave dental institute. Hand hygiene shall be carried first after arriving home, the clothes shall be changed and stored in ventilated place.

1) Instrument disinfection and sterilization: Reprocess of dental instruments shall strictly follow the Regulation for disinfection and sterilization technique of dental instruments (upon Local Regulation: WS 506-2016 in China).

2) Surface disinfection: After each treatment, the disinfection should be carried out on the surfaces of all the facilities, equipment and high-frequency contact point, such as chair, door handle, computer and other surfaces. The first choice is to wipe with 500 mg/L-1000 mg /L chlorine-

containing disinfectant, for non-corrosion resistant surfaces, 75% ethanol can be used for wiping, and the disposable disinfection wipes (containing effective ingredients against COVID-19) can also be used for one step cleaning and disinfection; surfaces with high-frequency contact such as sink, door handle and faucet shall be disinfected at least every 2 hours; and dental unit waterline can be rinsed for 30 seconds when needed.

- 3)** Air disinfection: Turn on the air disinfection machine or properly open the window for ventilation during the treatment. After noon shift and afternoon shift, strengthen disinfection by irradiation with ultraviolet lamp for 30 minutes ~ 60 minutes, then open the window for ventilation for at least 30 minutes.
- 4)** Requirements for clinic room floor: The floor of the clinic room should be kept clean and dry and disinfected every 2 hours. In case of obvious pollution, the decontamination, cleaning and disinfection should be performed with 500 mg/L~1000 mg/L chlorine-containing disinfectant. All anti-slip mats on floor should be removed.
- 5)** Medical waste management: It is required to strengthen medical waste management, focus on the training of healthcare personnel and cleaning personnel. Protective equipment such as surgical masks and hats worn by medical personnel should be treated as medical waste. The medical waste in the clinic room should be transported to the temporary storage of medical waste in a timely manner, and the medical waste shall be cleaned up on a daily basis. After the daily delivery, the temporary storage of medical waste shall be cleaned and disinfected with 1000mg/L chlorine-containing disinfectant. Personal protection is required for medical waste disposal personnel.
- 6)** Terminal disinfection: After daily treatment, the terminal disinfection should be carried out on the floor and surfaces of all objects every day. It is recommended to wipe with 1000 mg/L chlorine-containing disinfectant or disinfectant wipes and rinse the dental unit waterline for 2 minutes and

disinfect the waterline if necessary. The 500mg/L chlorine-containing disinfectant can be used to disinfect saliva suction pipes, spittoons and sewage pipes; after ultraviolet irradiation for 30 minutes ~ 60 minutes, ventilation shall be carried out. Personal protection and hand hygiene are required for the personnel.

Cleaning and disinfection of hospital setting¹¹

Protection of healthcare personnel

According to the 'Technical Guidelines for Use of Personal Protection Equipment for Healthcare Personnel for COVID-19 (Trial)' issued by the Ministry of Health of the People's Republic of China, the procedures, interventions, infection control and protective measures can be divided into three categories based on the risk of exposure (Table 1). Suction aspirators are recommended in irrigation procedures (wound irrigation and oral irrigation) to prevent splashing.

According to the WST-512-2016 Guidance of Environmental and Surfaces Cleaning, Disinfection and Infection Control in Hospitals in China, the wards of the Oral and Maxillofacial Surgery unit can be divided into three areas based on the risk of infection:

- Low-risk areas: facilities not accessible by patients, including doctors' and nurses' lounges.
- Medium-risk areas: areas accessible by normal and stable patients, mainly referring to the general ward and doctors' office.
- High-risk areas: infected or contaminated areas or isolation areas for highly susceptible individuals, such as operating theatres, intensive care units (ICU)/ post-anaesthesia care units (PACU), isolation rooms.

The cleaning and disinfection policy and practice for different levels of risk areas are shown in Table 2. Terminal cleaning and disinfection should be performed in high-risk areas in case of admission of suspected or confirmed COVID-19 cases: Cleaning and disinfection with 1000 mg/l chlorine-contact time of approximately 30 minutes, regular cleaning and disinfection with 1000 mg/l chlorine-containing compounds-> repeat spraying with 3% sodium hypochlorite solution -> contact time of approximately 30 minutes -> allow to air dry.

Table 1 Classification and protection of common procedures in oral and maxillofacial surgery.

Risk of exposure	Types of contact and exposure	Relevant procedures	Personal protective equipment										
			Hand hygiene	Scrubs	Surgical caps	Surgical masks	Respirators	Gloves	Disposable gowns	Hazmat suit	Face shields/eye goggles	Plastic disposable coversties	
Low risk	Indirect contact	Health education, history taking, ward rounds, preoperative consent taking	•	•	•	•							
Moderate risk	Direct contact with patients. Non-aerosol-generating invasive procedures	Physical examination, fine needle aspiration, injection, electrocardiogram (ECG) monitoring, wound dressings, nebulisation	•	•	•	•		•				•	
High risk	Normal patients with contact and exposure to aerosol and body fluids	Nasopharyngeal and oral suctioning, dental treatment, incision and drainage, wound irrigation, use of rotary handpiece system, nasogastric tube or urinary catheter insertion	•	•	•	•	◊	•	◊			•	◊
	Aerosol-generating upper respiratory tract procedures in PUI	Endotracheal intubation, tracheostomy, airway suctioning in patients who are not adequately screened prior to admission due to acute and severe illness or suspected COVID-19 cases	•	•	•		•	•	•	◊		•	◊

• Recommended; ◊ Selection based on risk of exposure.

Table 2 Cleaning and disinfection policy and practice.

Risk of infection	Methods	Frequency (per day)	Agents/disinfectants
Low risk areas	Use detergent and water for cleaning	1 to 2 times	Water
Intermediate risk areas	1. Clean floors with chlorine-containing disinfectants; contact time of approximately 30 minutes is recommended. 2. Contact time of approximately 10 to 30 minutes is recommended for surfaces disinfection followed by cleaning with water.	1 to 2 times	500 mg/l chlorine-containing disinfectants
High risk areas	1. Clean floors with chlorine-containing disinfectants; contact time of approximately 30 minutes is recommended. 2. Contact time of approximately 10 to 30 minutes is recommended for surfaces disinfection followed by cleaning with water. 3. Thorough cleaning and disinfection after each clinical procedure, the subsequent clinical or surgical procedures can only be carried out after terminal cleaning and disinfection of the operating theatre.	> 2 times	500 mg/l chlorine-containing disinfectants

All contaminated areas or surfaces (by body fluids, blood, body waste or secretions) are to be promptly cleaned and disinfected.

Which essential oral health care should continue to be provided during the COVID-19 response by adopting a safe, evidence-based, and realistic set of interventions that do not generate aerosols?

Due to the unique characteristics of dental procedures where a large number of droplets and aerosols could be generated, the standard protective measures in daily clinical work are not effective enough to prevent the spread of COVID-19, especially when patients are in the incubation period, are unaware they are infected, or choose to conceal their infection. Dental emergencies can occur and exacerbate in a short period and therefore need immediate treatment. Only dental and oral maxillofacial emergency cases were taken care of in this critical time. Emergencies including dental and oral infections, dental trauma, acute pulpitis, etc^{2,3,19,20}.

Dental Pain

For a carious tooth is diagnosed with symptomatic irreversible pulpitis, pulp exposure could be made with chemo-mechanical caries removal under rubber dam isolation and a high-volume saliva ejector after local anesthesia; then,

pulp devitalization can be performed to reduce the pain. The filling material can be replaced gently without a devitalizing agent later according to the manufacturer's recommendation. Dentists should take strict personal protection measures and avoid or minimize operations that can produce droplets or aerosols. The 4-handed technique is beneficial for controlling infection.

Oral and maxillofacial emergencies

Most emergency cases were patients from oral and maxillofacial department. Patient with oral and maxillofacial trauma, oral space infection, pericoronitis, and temporomandibular joint dislocation. For oral and maxillofacial surgery patients, the following diagnosis and treatment were recommended:

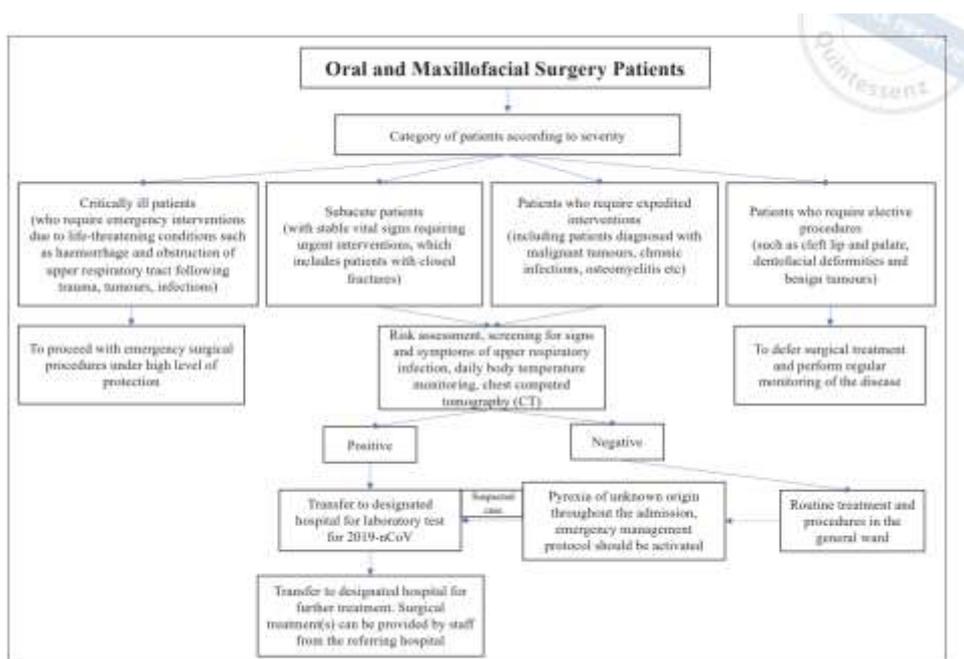
- 1) Patients who require elective procedures, such as cleft lip and palate, dentofacial deformities and benign tumors are advised to defer the procedures.
- 2) Patients who require expedited interventions, including patients diagnosed with malignant tumors and chronic infections: a complete risk assessment is necessary prior to admission, including a full blood count, serum biochemistry, chest radiograph and preanesthetic assessment. A lung computed tomography (CT) scan and laboratory testing for COVID-19 should be performed if indicated. A Hospital Admission Application and Declaration form of Peking University School and Hospital of Stomatology (PKUSS) should be signed by patients and family members if the screening yields negative results and there is no recent history of fever and respiratory symptoms prior to hospitalization.
- 3) For critically ill patients who require emergency interventions due to life-threatening conditions such as hemorrhage and obstruction of upper respiratory tracts following trauma, tumors, infections, all

healthcare providers are required to adhere to strict prevention and infection control protocol in addition to the practice of routine universal precautions.

- 4) In subacute patients with stable vital signs requiring urgent interventions, which includes patients with closed fractures, non-life-threatening orofacial infections, or odontogenic infections, screening for COVID-19 and preoperative assessments are necessary to prevent unnecessary exposure to COVID-19. It should be noted, however, that the types and patterns of pyrexia in patients who suffer from maxillofacial trauma and/or infections can be distinguished from those due to COVID-19 through thorough history taking, clinical examination, laboratory testing and radiographic investigations.

The algorithm of diagnosis and treatment for patients categorized according to the urgency and severity of the disease and interventions is shown in Fig 2.

Fig 2 Algorithm of diagnosis and treatment for patients categorized according to the urgency and severity of disease control and prevention.



Which procedures, surgeries, and non-urgent dental care should be postponed during the COVID-19 response?

All non-emergency cases should be postponed during the COVID-19 response, especially management requiring the use of high-speed handpiece or ultrasonic instruments or any management may contact patients' secretions, saliva or blood aerosolize and contaminated. ¹⁸

Dental patients who cough, sneeze, or receive dental treatment including the use of a high-speed handpiece or ultrasonic instruments make their secretions, saliva, or blood aerosolize to the surroundings. Dental apparatus could be contaminated with various pathogenic microorganisms after use or become exposed to a contaminated clinic environment. Thereafter, infections can occur through the puncture of sharp instruments or direct contact between mucous membranes and contaminated hands. ²

Due to the unique characteristics of dental procedures where a large number of droplets and aerosols could be generated, the standard protective measures in daily clinical work are not effective enough to prevent the spread of COVID-19, especially when patients are in the incubation period, are unaware they are infected, or choose to conceal their infection. ²

Responses in other aspects in dentistry

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 Existing smart devices and applications have already made it possible for students to listen to and review lectures whenever and wherever

possible. Universities has delayed their off-line study and online learning has started in many schools since mid-February. Students were encouraged to engage in self-learning, make full use of online resources. Meanwhile, psychological services were provided to studies who were in need. ²

Dental public health: Apart from online consultancy, online dental public health campaigns were designed and carried out countrywide around the World Oral Health Day. Millions of viewings were generated and showed possible new campaign methods and their great impacts. Positive and useful oral health information were delivered to general public. ⁴

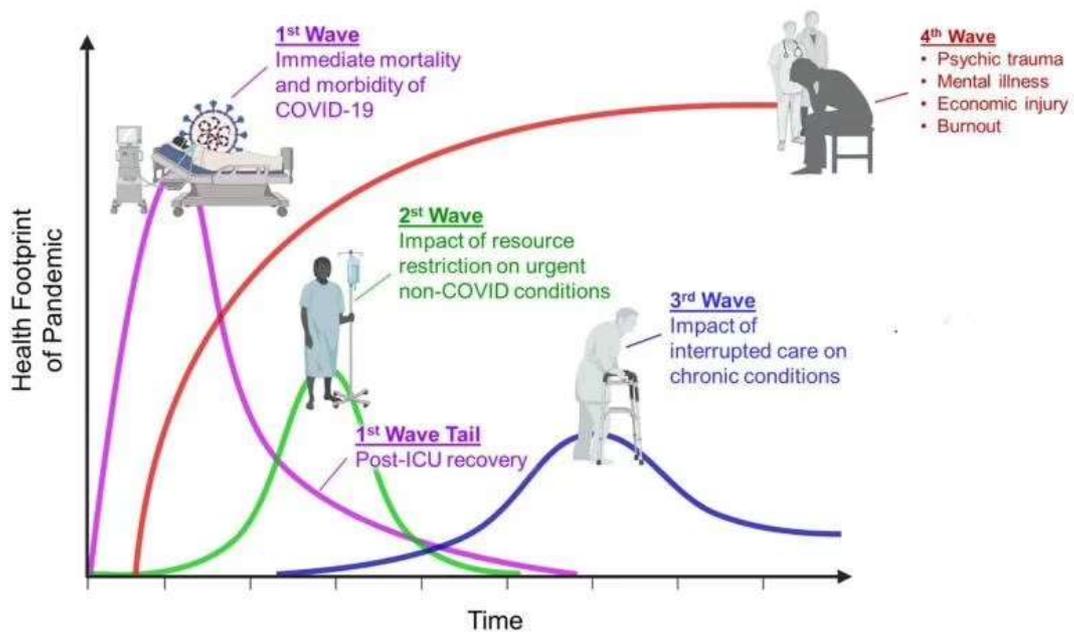
Mental health of oral patients: Public health emergencies have an impact on the public mental health. The outbreak of the novel coronavirus has affected the normal diagnosis and treatment services in oral medical institutions across the country. Delay of non-emergency dental service will have a potential impact on the experience, cognition, treatment and rehabilitation of patients with oral diseases. Some oral psychosomatic diseases closely related to patients' psychological state, such as oral mucosal disease, temporomandibular joint disease, bruxism, periodontal disease and so on. Experts provided scientific analysis on the possible psychological stress symptoms of patients with different oral diseases and provided suggestions to dental professionals to identify these patients and put forward for remote consultation and emergency treatment of dentists. ²¹

Oral mucosal disease management and prevention: Because of high mental tension and work intensity, unable to drink water for hours after entering the isolation ward and insufficient sleep, front line medical staff and other professionals might suffer from oral mucosal ulcers and other oral mucosal diseases. It is known that not only medical staff, but also police officers, community workers, long-term family members, and even patients with mild COVID-19, as well as those with oral mucosal disease in the past,

all claimed they feel uncomfortable with oral mucosal disorders, which mainly include recurrent aphthous ulcer (RAU), chronic cheilitis and oral lichen planus. Experts provided suggestions on the prevention and care of the oral mucosal diseases above mentioned during fighting against COVID-19, focusing on the measures to deal with the oral mucosal damage caused by stress response. ⁷

Social and economic burden: As we understand the health footprint of pandemic, the impacts of resource restriction and interrupted care on chronic conditions may have subsequent social and economic impact (Fig 3). Researches around these topics has been started to identify the new need and provide evidence for further health and economic policy-making during the recovery time.

Figure 3 Health footprint of pandemic



Conclusion

With consistent effort over the past few months, COVID-19 has been controlled in China. Dental healthcare professionals have actively participated in the disease control and the current situation in oral health setting is satisfactory from the infection control-wise. Oral health institutions, hospitals and clinics are slowly recovering from the pandemic control. Lessons learned from dealing public health emergencies and there is a long way to go in disease control and handling oral disease burdens. WHOCC CHN26 has collected anti-COVID-19 experience and knowledge in dental settings in China and to share with global colleagues in this critical time, hope to help all colleagues and patients get through this difficult time soon.

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