



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Precaution of 2019 novel coronavirus infection in department of oral and maxillofacial surgery

Zhao Zhiguo^{a,1}, Gao Dan^{b,*}

^a Department of Stomatology

^b Department of Clinical Laboratory, Shengjing Hospital of China Medical University, 36 Sanhao Street, Heping District, Shenyang, China

Accepted 2 March 2020

Abstract

The epidemic of the 2019 novel coronavirus (2019-nCoV) infection has presented as a critical period. Until February 23rd 2020, more than 77 000 cases of 2019-nCoV infection have been confirmed in China, which has a great impact on economy and society. It has also interfered with ordinary medical practice of oral and maxillofacial surgery seriously. In order to protect the oral and maxillofacial surgery medical staff from 2019-nCoV infection during the outbreak period, this paper suggests the necessary medical protective measures for oral and maxillofacial surgery outpatients and wards.

© 2020 The British Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Keywords: 2019 novel coronavirus infection; medical protection; oral and maxillofacial; surgery

In December 2019, unexplained pneumonia cases occurred in Wuhan, Hubei Province.¹ It was later confirmed to be a new type of pneumonia caused by a novel coronary viral infection (2019 Novel Coronavirus, 2019-nCoV).^{2,3} On January 30, 2020, the World Health Organization (WHO) has declared COVID-19 as the sixth public health emergency of international concern.⁴ At present, the epidemic of 2019-nCoV infection has entered a critical period. Oral and maxillofacial surgeons are prone to contact patients in close proximity, which is very likely to cause occupational exposure and cross infection. At the same time, compared with the 2019-nCoV infection prevention and control first-line departments, department of oral and maxillofacial surgery may have potential problems such as insufficient awareness, insufficient protection measures, and irregular protection procedures. Although our hospital's oral and maxillofacial surgery cur-

rently focuses on emergency work, but there has been no 2019-nCoV infection caused by work reasons among the medical staff of oral and maxillofacial surgery during the outbreak, so we would like to share the strategies, measures and experience of prevention of infection among the medical staff of oral and maxillofacial surgery.

Characteristics of 2019-nCoV infection

2019-nCoV is a novel coronavirus RNA with a round or oval shape, about 60 to 140 nm in diameter, belonging to beta genus coronavirus similar to SARS-CoV.¹ At present, the homology between 2019-nCoV and bat-SL-CoVZC45 is 85%.¹ It is generally believed that the host is rhinolophus, but whether there is an intermediate host has not been confirmed.² The infection source is mainly pneumonia patients infected with 2019-nCoV, asymptomatic patients can also be the source of infection.¹

The physical and chemical characteristics of 2019-nCoV mostly come from the research of SARS-CoV and MERS-CoV. The virus is heat sensitive and can be inactivated when

* Corresponding author. Tel.: +86 024 96615-72118.

E-mail addresses: zhaozg@sj-hospital.org (Z. Zhao), gaod@sj-hospital.org (D. Gao).

¹ Tel.: +86 024 96615-61524.

exposed to ultraviolet or at 56°C for 30 minutes. At the same time, the use of ether, 75% ethanol, chlorine disinfectant, peracetic acid and chloroform and other fat solvents can effectively inactivate the virus, but chlorhexidine can not effectively inactivate the virus.¹

2019-nCoV is considered to be generally susceptible to people, with the ability of human to human transmission, including: respiratory droplets transmission and contact, fecal oral transmission or direct contact with secretion with virus.⁵ The incubation period of 2019-nCoV infection is 1-14 days, mostly 3-7 days.¹ The condition of the elderly and those with basic diseases is more serious after infection, and children and infants also have diseases, but the symptoms are relatively light.⁵ Common symptoms after 2019-nCoV infection are fever, dry cough, muscle ache or fatigue.⁶ However, some patients only showed low fever, slight asthenia, even no fever, pneumonia and other clinical manifestations.⁵

Protection of medical staff in department of oral and maxillofacial surgery

Because the novel coronavirus pneumonia is the main transmission route through respiratory droplets and contact transmission, medical staff should follow the principle of standard precaution, including doing personal protection, hand hygiene, environmental management, hospital waste management, cleaning and disinfection of objects, so as to reduce the risk of hospital acquired infection.⁷ At present, the standards for the protection of airborne diseases are divided into:⁸

General protection: wearing work clothes, disposable surgical masks, wearing latex gloves when necessary;

First level protection: wearing work clothes, disposable work caps, disposable surgical masks, disposable isolation clothes and disposable latex gloves;

Second level protection: wearing disposable working cap, medical protective mask (N95), protective glasses, protective clothing or protective screen, disposable protective clothing or disposable impermeable isolation clothing, disposable latex gloves, and disposable shoe covers if necessary;

Third level protection: on the basis of second level protection using full face shield, full face respirator or positive pressure head cover.

The oral and maxillofacial medical staff should choose the appropriate personal protection according to different exposure risks.

Prevention and control of diagnosis and treatment area

The consulting room should be provided with windows for ventilation and air disinfection. If possible, electrostatic adsorption air steriliser or circulating air ultraviolet air sterilizer can be used for air disinfection. There is no air steriliser

to use ultraviolet lamp for irradiation, and the ultraviolet lamp needs to be used in the unmanned state.

The surfaces of various objects are wiped and disinfected with 1000 mg/L chlorine containing preparation 3-4 times a day, and the last disinfection is arranged after the completion of all diagnosis and treatment.

The floor is sterilised with 1000 mg/L chlorine containing preparation twice a day, and the last disinfection is arranged after all diagnosis and treatment work is completed.

Prevention and control of outpatient department of oral and maxillofacial surgery

The first point is to carry out health protection education for patients. It is recommended that all patients should wear masks to reduce the risk of cross infection. Because only by cutting off all suspected sources of infection can the transmission be stopped. For oral and maxillofacial surgical diseases that do not need urgent treatment (such as tooth extraction, etc.), it is suggested that the patient should suspend the treatment. But for the emergency patients, we divide them into the following three categories:

Medical protection for patients with fever

More than 80% of patients with 2019-nCoV pneumonia have fever.^{6,9} However, the average incubation period of 2019-nCoV infection is 5.2 days, and the longest incubation period can be more than 14 days.³ During the incubation period, the patients have no symptoms, but they are still infectious and become an important source of viral infection.¹ In view of the severe situation of 2019-nCoV infection, all medical staff of clinics should be encouraged to comply with the second level protection for high-risk areas, and for patients with the risk of splashing, it is suggested to consider the third level protection as appropriate.

Medical protection for patients with fever

In view of the current severe situation, each hospital will divert fever patients to fever clinic, once the patients 2019-nCoV infection is excluded from a fever clinic, and such patients may go to the department of oral and maxillofacial surgery for treatment again. However, due to the high false negative rate of nucleic acid detection of 2019-nCoV infection, for patients with fever, oral and maxillofacial surgical medical staff should be well protected. In novel coronavirus endemic areas, for fever patients, it is recommended to take the second level protection as standard, and use the third level protection if necessary.

Medical protection against novel coronavirus infection patients

If the patient has been diagnosed with 2019-nCoV infection, and the medical staff carries out the relevant physical

examination, improper protection is easy to infect. Therefore, it is necessary to reduce the relevant physical examination. Because there is a high risk of splashing in oral and maxillofacial surgery, three-level protection should be achieved.

Prevention and control of oral and maxillofacial surgery ward

The arrangement of oral and maxillofacial surgery should be combined with the epidemic situation of infectious diseases, and the operation should be arranged reasonably on the basis of taking into account the health of both doctors and patients. It is suggested to postpone the operation for the patients with cleft lip and palate, dentofacial deformity and benign tumours of maxillofacial region. For the critical patients, the indications of emergency operation should be strictly mastered, and the personal protection should be carried out strictly according to the disinfection and isolation standards. For critical patients in wards, we divide them into the following two categories:

Novel coronavirus infection investigation and medical protection for patients without fever

First of all, epidemic history is an important part of diagnosis, and any possible contact history must be vigilant. Because some patients with 2019-nCoV infection only showed low fever, slight asthenia, and even no fever or pneumonia. Therefore, novel coronavirus infection can not be ruled out without fever. Typical blood examination (normal or decreased leukocyte count or lymphocyte count in the early stage of the disease) and chest CT manifestations (consolidation, bilateral and peripheral disease, greater total lung involvement, linear opacities, “crazy-paving” pattern and the “reverse halo” sign.) help identify potential 2019-nCoV pneumonia patient.^{10,11} However, it has been reported that patients with 2019-nCoV infection did not have any chest CT manifestations, and the hemogram was completely normal.⁵ It is suggested that novel coronavirus infection can not be completely excluded by normal CT and haemogram.

Therefore, in view of the fact that patients with 2019-nCoV infection cannot be completely excluded before operation, and there is a risk of cross infection among medical staff, emergency operation must be carried out on the basis of proper protection.

Medical protection for novel coronavirus infected patients

For patients diagnosed with 2019-nCoV infection who must undergo emergency surgery, the operating room shall be informed in advance. First, it is necessary to select a negative pressure operating room or isolation operating room, minimise unnecessary items in the operating room, strengthen disinfection and isolation measures, and prepare isolation

protective equipment.¹² When using general anaesthesia, tracheal intubation should use standard fast sequence induction intubation, use muscle relaxant as much as possible to avoid the spread of droplets caused by patients' choking.⁸ Three levels of protection are recommended for all operation related personnel. The final disinfection should be performed after the operation. After the operation, the patient should be sent to the isolation ward. The isolation could end when the temperature returns to normal for more than three days, the respiratory symptoms improved significantly, the pulmonary imaging inflammation was absorbed obviously, and the detection of respiratory pathogenic nucleic acid is negative twice in a row (the sampling time interval is at least one day).¹³

Summary

The general suggestions are as follows: (1) In view of the fact that the medical staff of oral and maxillofacial surgery belong to the high-risk exposure group, it is suggested that the outpatient medical staff in the epidemic area should take the second level protection, if necessary, the third level protection, and the surgical staff should take the third level protection. (2) We should prevent and control the epidemic situation in all diagnosis and treatment areas, and reduce the routine outpatient and ward work for non critical diseases as much as possible. (3) For the incubation period or asymptomatic virus carriers, there is a lack of effective screening methods, which means that we need to be vigilant at all times.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

The research was authorised by Ethics Committee of Medical Research and New Technology, Shengjing Hospital of China Medical University (Ref#2020PS042 K). This article does not cover patients' privacy.

References

1. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China [published online ahead of print, 2020 Jan 29]. *J Med Virol* 2020, <http://dx.doi.org/10.1002/jmv.25689>.
2. Ji W, Wang W, Zhao X, et al. Cross-species transmission of the newly identified coronavirus. *J Med Virol* 2020;**92**(4):433–40, <http://dx.doi.org/10.1002/jmv.25682>.
3. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia [published online ahead of print, 2020 Jan 29]. *N Engl J Med* 2020, <http://dx.doi.org/10.1056/NEJMoa2001316>.

4. Lai CC, Shih TP, Ko WC, et al. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges [published online ahead of print, 2020 Feb 17]. *Int J Antimicrob Agents* 2020;105924, <http://dx.doi.org/10.1016/j.ijantimicag.2020.105924>.
5. Chan JF, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* 2020;**395**(10223):514–23, [http://dx.doi.org/10.1016/S0140. S0140-6736\(20\)30154-9](http://dx.doi.org/10.1016/S0140. S0140-6736(20)30154-9).
6. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China : a descriptive study. *Lancet* 2020;**395**(10223):507–13, [http://dx.doi.org/10.1016/S0140-6736\(20\)30211-7](http://dx.doi.org/10.1016/S0140-6736(20)30211-7).
7. Sabino-Silva R, Jardim ACG, Siqueira WL. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis [published online ahead of print, 2020 Feb20]. *Clin Oral Investig* 2020, <http://dx.doi.org/10.1007/s00784-020-03248-x>.
8. Yang F, Lin N, Wu JY, et al. Pulmonary Rehabilitation Guidelines in the Principle of 4S for Patients Infected With 2019 Novel Coronavirus(2019-nCoV). *Zhonghua Jie He He Hu Xi Za Zhi* 2020;**43**(0):E004, <http://dx.doi.org/10.3760/cma.j.issn.1001-0939.2020.0004>.
9. Zhu N, Zhang D, Wang W, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med* 2020;**382**(8):727–33, <http://dx.doi.org/10.1056/NEJMoa2001017>.
10. Lei J, Li J, Li X, et al. CT Imaging of the 2019 Novel Coronavirus (2019-nCoV) Pneumonia [published online ahead of print, 2020 Jan 31]. *Radiology* 2020:200236, <http://dx.doi.org/10.1148/radiol.2020200236>.
11. Bernheim A, Mei X, Huang M, et al. Chest CT Findings in Coronavirus Disease-19 (COVID-19): Relationship to Duration of Infection [published online ahead of print, 2020 Feb 20]. *Radiology* 2020:200463, <http://dx.doi.org/10.1148/radiol.2020200463>.
12. Yu GY, Lou Z, Zhang W. Several Suggestion of Operation for Colorectal Cancer Under the Outbreak of Corona Virus Disease 19 in China. *Zhonghua Wei Chang Wai Ke Za Zhi* 2020;**23**(3):9–11, <http://dx.doi.org/10.3760/cma.j.issn.1671-0274.2020.03.002>.
13. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China [published correction appears in Lancet. 2020 Jan 30;:]. *Lancet* 2020;**395**(10223):497–506, [http://dx.doi.org/10.1016/S0140-6736\(20\)30183-5](http://dx.doi.org/10.1016/S0140-6736(20)30183-5).