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# Advances in Oral and Maxillofacial Surgery

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## Effect of coronavirus pandemic on oral and maxillofacial surgical education and training: Developing standards for effective online training

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## ABSTRACT

Oral and maxillofacial surgery deals with the diagnosis and treatment of dentofacial problems and usually requires a four year specialized training after a bachelor's degree in dental surgery. The COVID 19 pandemic in early 2020 led to disruptions in the training programs worldwide and urged the supervisors and faculty to devise ways and means to continue the residents' learning experience utilizing different online teaching modalities. An account of some strategies for developing standards for effective online training to equip oral and maxillofacial training programs for similar future emergencies.

### 1. Introduction

Oral maxillofacial surgery (OMFS) is a surgical discipline of dentistry that deals with the diagnosis and treatment of various dentofacial problems. OMFS is particularly a high demanding discipline that requires at least 4 years of specialized training after completing the basic dental graduate degree. Considering the geographic location, it may be necessary to obtain a medical degree before enrolling into the OMFS post-graduate training program. OMFS domain involves performing orthognathic surgeries for jaw imbalances, facial injuries/fractures and offers reconstructive and dental implant surgeries. They also crater for benign and malignant tumors and cysts of the jaws involving the maxillofacial areas. Along with this maxillofacial surgeon are licensed in a few countries such as USA to administer anesthesia and deep sedation providing best pain management services to the patient [1].

Corona virus was a major setback this year, turning the world upside down. It was first reported in December 2019, the disease caused by corona virus known as COVID-19, quickly reached to almost every part of the world [2]. The COVID-19 virus was named 2019-novel coronavirus (2019-nCoV) at first, but later changed to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) officially [3]. Nonetheless, preventive measures to be taken in controlling the spread of SAR-CoV-2 in day to day life is still a serious challenge. SARS-CoV-2 situation has also affected OMFS discipline, as it relies on direct contact with patients

during consultation and surgeries. Numerous authorities after assessing the post-SARS-CoV-2 situation recommended to reschedule elective surgeries and to shift inpatient procedures to outpatient settings, when feasible [4]. Subsequently, they recommended to halt all elective, and non-emergency surgeries and services. These urgent steps allowed to restrict the personnel exposure and also to preserve the resources of the hospitals including staff, PPE, ventilators, beds and ICUs etc. These modifications in OMFS and other surgical disciplines, helped to accommodate the critical shortages of hospital resources as the pandemic was evolving. This indirectly had a major impact on the education and training of oral and maxillofacial surgery along with all other surgical training disciplines. Apart from the government and hospital policies, strategies need to be devised to evolve and evaluate our current methods of education and training. Measures are thereby being taken to continue the quality of surgical training and education so that competency of the residency programs remain minimally affected [5–8]. A brief review of this novel virus would help better understand this worldwide phenomenon.

### 2. Etiology and transmission

Coronavirus is a RNA virus which is enveloped and has a single stranded ribonucleic acid, with a solar corona resemblance [9]. Spike protein (S) is one of the proteins that attaches itself to

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angiotensin-converting enzyme 2 receptor causing the amalgamation of host cell membranes with the envelope [10]. This virus has bats as its primary host and may get transmitted to humans by wild animals like pangolin etc. [11] Human-to-human spread of this disease happens primarily either by direct contact or while dispersion of droplets when an infected person coughs or sneezes [12].

### 3. Pathogenesis

The main pathogenesis of SARS-COV-2 infection as a respiratory system targeting virus was severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury [13]. Significantly high blood levels of cytokines and chemokines were noted in patients with SARS-COV-2 infection that are reasoned to promote disease severity.

### 4. Diagnosis and treatment modalities

Since the novel nature of this disease, no certain diagnostic parameters were identified earlier. However, now guidelines have emerged to ensure good diagnostic accuracy. The most common symptoms at onset of SARS-COV-2 illness are fever, cough, and fatigue, while other symptoms include sputum production, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia [14]. Other diagnostic measures include a positive real-time reverse-transcription polymerase chain reaction (RT-PCR) assay for SARS-COV-2 using respiratory or blood samples [15]. Certain characteristic chest CT features are highly suggestive of SARS-COV-2 pneumonia.

Conservative treatment involves isolation of the patients that were treated symptomatically with different methods. Currently, different vaccines or antiviral medicine to combat SARS-COV-2 disease are available [16]. It is obvious to state that there is an urgent need to conduct more research to discover the new drug for the definitive treatment of SARS-COV-2 disease.

### 5. Developing standards for effective online training

With the sudden rise in cases of coronavirus worldwide came the setback of adequate acquisition of skills and knowledge for the oral and maxillofacial trainees worldwide. This challenge brought along an opportunity to think of ways and means to continue the essential academic and training activities for the residents and fellows. It is hereby necessary to develop standards and practices which can be employed for effective online training, so as to be prepared for any upcoming crisis situations. Below is an account of some of the challenges faced and the means incorporated to overcome the challenges during these trying times:

### 6. Communication

Communication is the key in any field of work and in the past, the only way to communicate was one to one. However, science and technology have enhanced the experience of communication by allowing video calls, voice notes and emails readily accessible. The ability to hear and see people from one part of the world to another has opened new possibilities to communicate during the SARS-CoV-2 pandemic [17]. With such advanced technologies, there are many applications that can facilitate communication between patient-consultant and consultant-trainees or among trainees simultaneously. Hence, through these kind of communication platforms, remote learning is easily achievable.

### 7. Remote learning

This has become as one of the major contributions of internet towards learning via different international speakers and courses. Online

courses are not only limited to lectures or presentations, but the possibility of live oral and maxillofacial surgeries which can be projected via cameras and internet online anywhere in the world for the wider benefit of trainees can be looked into. This not only imparts the necessary knowledge but also provides excellent visibility of the operatory field to every participant with minimal risk of spreading infections. Here we can discuss an example of fellowship programs which can be offered such as Global Online Fellowship [18] (GOLF) which is a two-year curriculum with one month observership program, seven written online exams based on multiple-choice and an oral examination. This is one of the examples of utilizing remote learning to its full potential. Likewise, this fellowship has become a thriving platform and is accepted with great zeal worldwide.

### 8. Validation and certification

The need for physical presence during an examination of any level is no longer necessary. The traditional way of examination can be omitted if needed. Many universities and colleges offer online multiple-choice based written examinations to assess the theoretical knowledge, which can be conducted safely and efficiently [19]. However, services of a third party may be required to arrange such an exam. Most of the time, online exams are less expensive yet practical and may appeal to a great number of students that can participate from any distant area. Similarly interviews and viva based exams to assess the candidates better, can be easily conducted via internet provided private platforms.

Assessment of surgical competencies plays a key role in the surgical training programs, as it improves the standard of the education and training by judging the progress and competency of trainees. For surgical assessment purposes different tools are employed including the Clinical Evaluation Exercise (mini-CEX) and Direct Observation of Procedural Skills (DOPS) [20]. These evaluation methods measure the trainees' performance in workplace based on clinical skills, attitudes and behaviors. The examination is assessed by the clinical supervisor/expert in the field, who should be present physically when evaluating. The skills evaluated ranges from common basic procedures (e.g. tooth extraction at the foundation level) to more advanced surgical skills (e.g. jaw surgeries and third molar extractions etc.). These type of evaluations will maintain the physical distancing since a single examiner is assessing the candidate at one point in time. However, to further reduce the risk the presence of the examiner can be replaced via internet monitoring of the surgical candidate, further minimizing the risk for exposure.

### 9. Academic activities

For the continuation of quality education, academic activities such as journal clubs, case presentations, tumor board and grand rounds are of utmost importance. SARS-CoV-2 initially halted these activities to avoid congestion of masses and spread of virus. However, very rapidly, the use of internet based applications was adopted to continue these essential academic meetings and has since proved to be very valuable in this respect [21]. All the above mentioned activities can be safely conducted with hundreds and thousands of people joining and watching the activity over the internet. Active participation posed as a challenge in these platforms but with adversity came along the opportunity of learning various modes of engaging students in the online mode of education [22]. Various courses were conducted by the blended and digital learning teams for teachers to equip them with the skills to conduct an engaging session using various modalities like Kahoot, Padlet, Mentimeter etc. Thus now the participants can easily share their opinions and questions regarding the discussed agenda online. Positive contribution of these online based discussions is likely to continue in the future even after return of normal routine.

## 10. Telemedicine

Follow ups after post-operative surgical management by the patients are the mainstay of oral and maxillofacial clinical practice. Since the pathologies around head and neck region have a high recurrence rate, follow ups are integral to successful treatment [23]. However, follow ups require significant time duration of the day on part of the clinician and staff. On the other hand, patient may bare the expenses of a road trip and time, coming all the way from residence or workplace.

Telemedicine can provide a tremendous amount of benefit in this area particularly for low risk patients. Telemedicine operated via video call in which care giver can inquire about the history and perform online examination of the surgical area [24]. There is a possibility of sharing intra-oral and extra-oral pictures of the concerned area. If close examination is warranted patient scan be directed to visit their primary physician near the home. Radiographic images and reports can be examined and understood online, further minimizing a dire need for a patient to visit the clinician in person. The OMFS trainees can also join telemedicine sessions along with their supervisors/consultants boosting their learning regarding proper management of the patients. This will surely improve the patient management skills of the trainees within a safe distance. Apart from the patient-doctor communications only, trainee can also discuss various consults with their supervisors providing good quality and timely care to their patients. This pattern will surely improve the time management of the patients and the surgeons/trainees. Since this is a new avenue, proper training and workshops should be conducted to explore this option to the fullest.

## 11. Fellowship training

Ever since the pandemic has hit us, there have been several changes in the policies and guidelines of every healthcare system throughout the world. Reduction in non-emergency cases, more cautious approaches and preventive measures are being taken in the operating room; especially in the case of aerosol generation from the high risk patient [25]. The term "Aerosol" was coined by Frederick G. Donnan, defined as a suspension system of liquid or solid particles in a gaseous state [26]. Therefore, sterilized gown, face shield, face mask, protective eye wear, apparel for all operation theater/clinic personnel, surgical suction and fresh air should be compulsory. However, in enclosed compartments such as operation theater, fresh air ventilation would not be a possibility; this can be overcome via negative pressure system based operation theater and rooms. These systems allow outside air into the room due to lower air pressure; any air that flows out of the room has to pass through a filter. Negative pressure rooms are common in infection control, to ensure infectious diseases do not spread via the heating, ventilation, and air conditioning systems [27]. Apart from these precautions, SARS-CoV-2 testing and screening of healthcare workers should be performed time to time to reduce the spread of the virus [28]. Since, even a minor surgical procedure such as surgical tooth extraction can generate aerosol by using rotary devices. Safety measures aside, another concern to be highlighted is the lack of hands-on exposure for current trainees because of reduced influx of patient due to postponement of routine procedures which may affect their skills. Similarly, the number of institutes offering OMFS training are quite few, adding to the dilemma of decreased surgical exposure opportunities for the trainees [29]. Another important reason of reduction in influx of patients was the economical impact of SARS-COV-2 [30]. The ability of the patient to bare the procedural expenses were significantly hampered, which led to postponement of important surgical procedures such as resection of oral cancers. To compensate the loss of learning, an extension of fellowship/training by 3–6 months can be granted however it may disrupt the induction system e.g. delayed recruitment of new trainees, additional salary etc. Nonetheless, through video based learning of different surgical techniques and open discussion session with the faculty members may benefit the trainees in this regard. Also the opportunity of utilizing

simulation based training using surgical simulators and high fidelity simulators should be explored to further strengthen the clinical experience of oral and maxillofacial surgical trainees [31].

It has been nothing but a humble experience to witness the massive effect SARS-CoV-2 pandemic has brought not just on the people around the globe but has also wreaked havoc on the education and training worldwide and has put every health care system under great stress. It has come under realization that every program of surgical and medical training should have a factor of disaster handling system to overcome any challenges posed by similar crisis situations.

### Conflict of interest

None.

### Ethics statement/confirmation of patient permission

N/A.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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