

Resuming Clinical Teaching in the Era of COVID-19: Experiences and Protocols from a Dental School in Malaysia

(Menyambung Semula Pengajaran Klinikal di Era COVID-19: Pengalaman dan Protokol
daripada Institusi Pergigian di Malaysia)

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ABSTRACT

The rapid spread of the global pandemic COVID-19 had challenged the Malaysian Healthcare and Education Systems. Teaching and learning at dental schools across the country were drastically changed to online approach as the nation enforced Movement Control Order (MCO). However, translation of psychomotor skills still require hands-on approach to produce competent dentists upon graduation, but most dental schools were not prepared for the prevention of COVID-19 transmission that require more strict cross infection protocol. The aim of this paper was to describe the response by a dental school in Malaysia to COVID-19 in modifying the clinical teaching and learning, infrastructure, facilities, and clinical services, and enhancing the infection control protocol through risk assessment of COVID-19 transmission and prevention strategies. The paper also discusses the limitations of our approach, challenges in providing clinical services and supervision as well as implications of changes to our practice. In conclusion, COVID-19 has modified the delivery and implementation of clinical teaching and learning in Malaysia. However, within the limited fund and resources, dental teaching institutions need to adapt to the new normal clinical environment in order to ensure that dentals students graduate on time with sufficient clinical training.

Keywords: COVID-19; Dental Teaching Institutions; new norm; teaching and learning

ABSTRAK

Penularan wabak COVID-19 secara global telah menggugat sistem kesihatan dan pendidikan di Malaysia. Pengajaran dan pembelajaran di semua institusi pergigian di seluruh negara diubah secara mendadak dengan pendekatan dalam talian setelah penguatkuasaan Perintah Kawalan Pergerakan (PKP). Walau bagaimanapun, latihan kemahiran psikomotor masih memerlukan pendekatan langsung untuk melahirkan pengamal pergigian yang kompeten setelah tamat pengajian tetapi kebanyakan institusi pendidikan pergigian tidak mempunyai kesediaan untuk menghadapi pencegahan transmisi COVID-19 yang memerlukan protokol kawalan jangkitan silang yang lebih ketat. Tujuan kertas ini adalah untuk membincangkan respons institusi pengajaran pergigian terhadap pandemik COVID-19 dalam pengubahsuaian pengajaran dan pembelajaran klinikal, infrastruktur, kemudahan dan perkhidmatan klinikal, serta protokol kawalan jangkitan silang melalui strategi penilaian risiko untuk mencegah penularan wabak COVID-19. Kertas ini juga membincangkan limitasi, cabaran dalam perkhidmatan dan penyeliaan klinikal serta implikasi pengubahsuaian yang telah dilakukan terhadap amalan pergigian. Kesimpulannya, COVID-19 telah mencetus pengubahsuaian cara penyampaian dan pelaksanaan pengajaran dan pembelajaran klinikal untuk program pergigian di Malaysia. Namun begitu, dengan bekalan dana dan sumber tenaga yang terhad, institusi pendidikan pergigian perlu mengadaptasi dengan persekitaran klinikal normal baru untuk memastikan para pelajar lulus pengajian dalam tempoh yang ditetapkan dengan latihan klinikal yang mencukupi.

Kata kunci: COVID-19; Institusi Pendidikan Pergigian; norma baharu; pengajaran dan pembelajaran

INTRODUCTION

The coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has created unprecedented challenges in science and humanity. Declared as a pandemic in the first quarter of the year 2020 (World Health Organisation 2020c), it sweeps through globally with many countries undergoing or exiting lockdowns for contact suppression (Han et al. 2020; Ogden 2020; Ren 2020). As part of gradual release exit strategies, global industries are focusing towards COVID-19 prevention and safety of workers to maintain pandemic suppression under the new normal (Dickens et al. 2020). Among these, healthcare industry remains one of the most significantly affected sectors; it strives to address the surge capacity of hospitals in public health emergencies on one hand, and on the other hand resuming deferred and preventive healthcare to individuals and populations (California Department of Public Health 2021).

On the same basis, COVID-19 pandemic continues to affect higher education sectors globally. Similarly, dental teaching institutions are facing challenges from logistical, clinical, financial, and administrative perspectives, covering academic and clinical teaching activities, and provision of oral healthcare in primary and secondary care environment. Strict pandemic control measures and government regulations mean that clinical teaching, lectures, tutorials and assessments can no longer be conducted in the normal way. The safety of students, educators and the public remain the primary concern over the coming months or even years. Universities, therefore, need to adapt rapidly and innovatively to address various concerns arising from this situation.

As part of the new norms, classroom lectures were converted into video conference platforms such as Zoom, Microsoft Teams, Google Meet and WebEx (Chang et al. 2021; Iyer et al. 2020; Machado et al. 2020). Although these platforms are useful for theoretical content learning, there are concerns whether these may fall short in terms of practical and clinical skill elements. Whilst COVID-19 pandemic hastens educational innovations that has already been underway, online learning is not a substitute for the value of clinical experiences with actual patients. Most importantly, dental students will need to meet all of the learning outcomes and develop a certain level of competency as safe beginners in order to qualify and before entering the dental workforce (Faculty of General Dental Practice 2020a).

In Malaysia, since 18th March 2020 to date, the government continues to enforce various phases of

Movement Control Order (MCO), a cordon sanitaire aimed at breaking the chains of COVID-19 transmission. All academic institutions including dental institutes were instructed to close; on-site student activities were immediately rescinded, dental services were limited to emergency cases and integrating tele-dentistry into routine care is recommended (Al Kawas et al. 2020). In July 2020, the less-stringent conditional MCO began and dental educators were allowed to work on-site in preparation of campus return for selected cohorts of students. Infrastructural and facilities modifications were required in dental school clinics in order to adapt to the new norms and to address biosafety issues throughout the pandemic period. When dental schools were initially allowed to reopen, only postgraduates and final year undergraduate students could resume face-to-face clinical activities and final exams. However, when they are on campus, classes are still conducted online. Other students remained at home for online teaching and learning until August 2020 and completed their final exams virtually. In relation to clinical dental education, the current focus amongst most published literature is on adaptations of quality online teaching and learning. Researches on safe return and restructuring of dental education and dental services are rapidly evolving given the ongoing pandemic, and are important in informing decision makers, various stakeholders and the public alike. The aim of this article was to describe experiences and protocols used for re-opening of a Malaysian dental school at the Faculty of Dentistry, Universiti Malaya, Malaysia (FoDUM) during the COVID-19 outbreak. In this article, implementation strategies for re-opening of dental school were focused on modifications to: clinical teaching and learning; infrastructure and facilities; and clinical services. Furthermore, enhanced infection control protocols and risk mitigating measures will be discussed. Such experience sharing and clinical protocols may benefit dental institutes planning for clinical work resumption during this outbreak as well as to inform future pandemic preparedness.

FOCUSED MODIFICATIONS

Clinical Teaching and Learning

In FoDUM, although selected groups of students were allowed to return to campus, remote online learning, both synchronously and asynchronously, still continue to be in place to maintain physical distancing, thus controlling the spread of COVID-19 (Patil & Yan 2003; Sukuma et al. 2020). Multiple platforms were used for active learning

activities such as institutional e-learning system, open sources (Google Meet, Google Classroom, Microsoft Teams) and social media (Facebook, YouTube, WhatsApp Messenger). These channels were also utilised to disseminate information on standard operating protocols (SOP) and for infection control training updates among educators, students, dental nurses and administrative staffs. Dental students were to observe strict SOP to undergo clinical training with real patients and to complete their requirements (Dental Dean Council 2018) to enable them to sit for final exit examinations.

Training on the transmission-based precaution at FoDUM level was led by Infection Control Committee and conducted in a few phases for academic staff, support staff and dental students. The training involved virtual and hands-on activities (hand washing, donning and doffing personal protective equipment (PPE)). The training content was also disseminated via videos and e-posters through email and WhatsApp groups. Re-training is only conducted

when there are new updates in protocols following changes in local and global guidelines.

Infrastructure and Facilities

As restrictions for elective dental care were lifted, the primary concern is on managing bio-aerosol in students' dental clinics and to ensure safety of students, clinicians, staffs and patients (Sukumar et al. 2020). The main entry points at the faculty buildings were reduced from six points to only two and triage counters were set up at both points for temperature screening and history taking. Use of elevators were limited to 4 persons at a time to avoid overcrowding. In terms of communication, patient information sheets and infographic posters about COVID-19 were regularly updated and placed at strategic places on-site (in the elevators, registration counters and other areas around the faculty premises), and through the FoDUM's social media channels. Many student clinics were traditionally conducted in an open

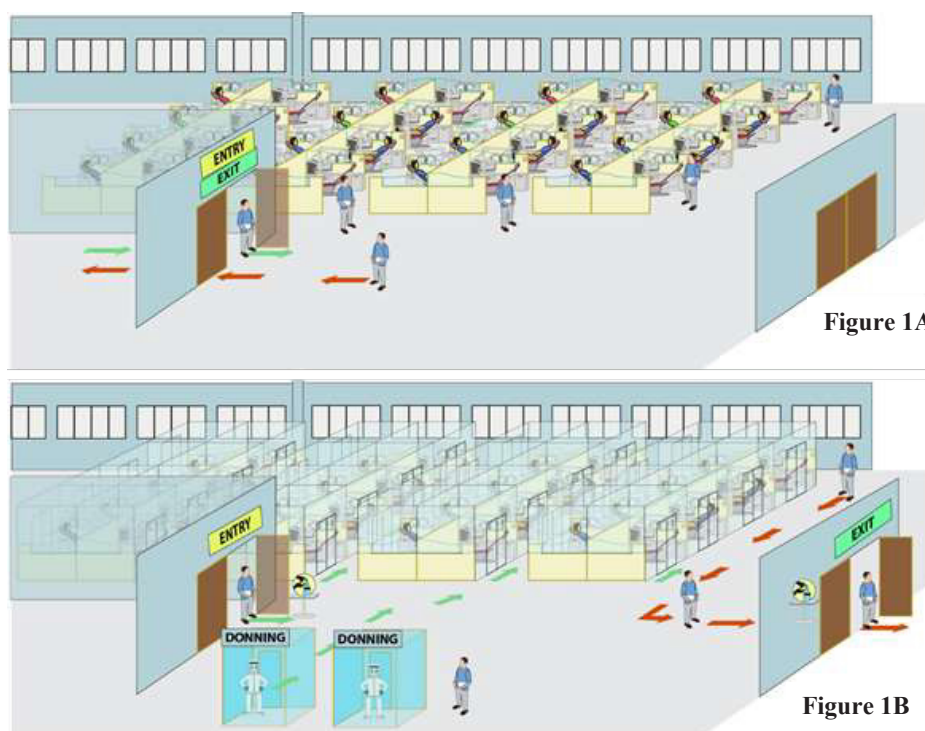


FIGURE 1. The polyclinic settings before and during COVID-19 outbreak in the Faculty of Dentistry, Universiti Malaya (A) shows the open plan student polyclinic at Faculty of Dentistry, University of Malaya before the COVID-19 outbreak. There are multiple procedural bays in each polyclinic where each bay has modest dividing walls that do not reach the ceiling. (B) shows the physical layout and flow of care delivery areas modifications in an open plan student polyclinic setting during the COVID-19 pandemic. Different doors were assigned for the entry and exiting the clinic. Hand disinfectant were placed close to the doors to maintain the hand hygiene for students, staffs and patients. Two donning areas were set up for staffs and students next to the entrance to have their PPE on before entering the procedural bays. Self-contained 'pods' were constructed around each procedural bays to control the aerosols in multiple dental chairs set up

plan layout (Figure 1(A)). Prior to re-opening of FoDUM, some modifications were made in the student polyclinics.

Self-contained dental treatment units ('Pods'): Splatter and aerosol contaminated with saliva and/or blood are produced during dental procedures. Hence, airborne transmission of pathogens including viruses such as SARS-CoV-2 is possible, and poses a significant challenge in view of mitigating the associated risks in an open plan environment (Holliday et al. 2021). Furthermore, polyclinic with multiple dental chairs carries challenging splatter and aerosol control due to wide ranges of dental aerosol-generating procedures (AGPs) and treatment being performed simultaneously by different operators in the vicinity. On this basis, in FoDUM, modifications were made based on a technical report lead by the National Services Scotland i.e. Ventilation, Water and Environmental Cleaning in Dental Surgeries Relating to COVID-19 (National Services Scotland 2020).

Accordingly, 'pods' or self-contained dental treatment units were constructed and with this containment, barriers between adjacent cubicles from all sides were raised at least 2 meters in width and height from the source of the aerosol (Figure 1(B)). This modification optimises the use of all dental chairs within the cubicles, which are separated by the barriers. During initial resumption of clinical sessions, construction of dental 'pods' was ongoing and the number of 'pods' available were limited. Hence, for the final year students who were allowed to return, AGP and non-AGP were conducted in dedicated polyclinics. On another note, for clinics with open cubicle settings e.g., in specialty training clinics, procedures were limited to non-AGP. When all students of different batches were allowed to return for the following academic year, the polyclinics were fully equipped with 'pods'. Both types of procedures (AGP and non-AGP) can be conducted within the 'pods'.

Entry and exit point for treatment clinic: Two different doors were assigned for entering and exiting the polyclinic. All patients were provided with alcohol-based hand rub before entering and exiting the polyclinics (Figure 1(B)).

Donning area: All staffs and students must don the PPE prior to entering respective procedural bays in the polyclinic. Two different donning areas were prepared near to the entrance (Figure 1B).

Clinical Services

Institutional enhanced infection control measures were developed based on various international guidance, local

professional and regulation bodies guidelines for safe return to dental services (Centers for Disease Control and Prevention 2020; Cochrane Oral Health 2020; Ministry of Health Malaysia 2020b). In compliance with the new normal during COVID-19 pandemic, FoDUM implemented screening procedures for every personnel entering the premise, through body temperature screening and questionnaires pertaining to travelling and contact exposure. Appointment based setting is prioritised to limit the number of patients within the premise and to allow proper disinfection time in between patients. Tele-consultation is considered when appropriate. The protocol for re-opening and re-structuring of dental clinic will be elaborated further in the following section.

ENHANCED INFECTION CONTROL PROTOCOLS

Risk Assessment of COVID-19 Transmission

Anyone visiting the faculty is required to complete the COVID-19 risk questionnaire as part of the screening protocol. This was based on available guidelines and one is advised to modify accordingly to the risks related to each locality. Table 1 is an example of a self-administered screening questionnaire adapted from the FoDUM screening questionnaire. The questions focus on patient's risk exposure, COVID-19 test, symptoms, and travel history. An open-ended question is also included for patients who wants to consult their potential risk category. Individual risk level categorisation is then deduced from the completed questionnaire. The questionnaire used was manually filled on paper at the entrance by the visitors.

Those who do not show any symptoms and are devoid of any high-risk activities (close contact to positive cases, recent travelling to COVID-19 hotspots or attended any mass gatherings with newly reported clusters) (World Health Organisation 2020d) were considered to be healthy and classified as low risks group. Meanwhile, patients diagnosed with COVID-19 or suspected individuals (symptomatic, person under investigation, person under surveillance) are considered as being in high-risk groups. For the latter group, treatment should be deferred until they are fully recovered or have been reassessed as low-risk. Table 2 summarises the individual risk category. Nevertheless, in the event of an absolute emergency, it is recommended for patients to be referred to designated COVID-19 task force clinicians and the treatment must be carried out in a designated urgent dental care treatment room (Cochrane Oral Health 2020; Faculty of General Dental Practice 2020b). At the FoDUM, we apply the same protocol. Patients with high risk for COVID-19 will be advised to defer their treatment if not

TABLE 1. COVID-19 Screening Questionnaire

Exposure to COVID-19	YES	NO
Within the past 14 days, have you;		
Had any close contact with any persons positive for COVID-19?	<input type="checkbox"/>	<input type="checkbox"/>
Had any close contact with any persons suspected for COVID-19?	<input type="checkbox"/>	<input type="checkbox"/>
Joined a gathering/meeting with cases that are COVID-19 positive?	<input type="checkbox"/>	<input type="checkbox"/>
Visited an area reported with COVID-19 positive cases?	<input type="checkbox"/>	<input type="checkbox"/>
Testing for COVID-19	YES	NO
Within the past 14 days, have you been tested for COVID-19?	<input type="checkbox"/>	<input type="checkbox"/>
Symptoms	YES	NO
Do you have any of the symptoms below?		
Fever	<input type="checkbox"/>	<input type="checkbox"/>
Cough	<input type="checkbox"/>	<input type="checkbox"/>
Sore throat	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty breathing	<input type="checkbox"/>	<input type="checkbox"/>
Runny nose	<input type="checkbox"/>	<input type="checkbox"/>
Lack of smell	<input type="checkbox"/>	<input type="checkbox"/>
Travel Information	YES	NO
Have you been abroad within the past 14 days?	<input type="checkbox"/>	<input type="checkbox"/>
Do you stay in the red zone in Malaysia?	<input type="checkbox"/>	<input type="checkbox"/>
Did you recently travel to any red zone in Malaysia within the past 14 days?	<input type="checkbox"/>	<input type="checkbox"/>

**If all questions are answered as 'NO', the surveyed person is considered as 'low-risk'*

***However, if any ONE of the questions answered as 'YES', the person is considered as 'high-risk' and necessary actions should be taken*

urgent. They will be referred to the Department of Emergency Medicine, University Malaya Medical Centre located at the adjacent building. Nonetheless, the faculty has prepared an isolation room to treat high risk patients who require urgent treatment, where the treatment will be provided by the members of the

Covid task force. Recovered COVID-19 patients can be treated for dental treatment. However, healthcare workers (HCW) should follow standard precautionary measures as there is insufficient evidence that the patients would be immune from re-infection (Tillett et al. 2021; World Health Organisation 2020b).

TABLE 2. Risk category for patients and dental operators

Low Risk	High Risk
No risk or unknown risk of infection e.g. <ul style="list-style-type: none"> • Healthy patients • Asymptomatic Recovered from COVID-19	Confirmed COVID -19 Suspected patients: Symptomatic <ul style="list-style-type: none"> • fever, fatigue, and dry cough shortness of breath, sore throat, aches and pains, anosmia, diarrhoea, nausea, and runny nose Suspected patients: Person under investigation (PUI) e.g. <ul style="list-style-type: none"> • acute respiratory infection (sudden onset of respiratory infection with at least one of: shortness of breath, cough or sore throat) with or without fever AND • travelled to/resided in a foreign country within 14 days before the onset of illness OR has close contact in 14 days before illness onset with a confirmed case of COVID-19 OR attended an event associated with known COVID-19 outbreak Suspected patients: Symptomatic Person under surveillance (PUS) e.g. <ul style="list-style-type: none"> • Travel history from affected places, develop acute respiratory infection, but is not a fit case definition of a PUI

PREVENTION OF DISEASE TRANSMISSION

Since COVID-19 can be transmitted via contact with droplets and aerosols, dental treatment imposes risks for disease transmission as most dental treatment involves AGP (Hinds 1999). These procedures include the use of high- and slow-speed air-turbine handpieces for surgical or restorative procedures, 3-in-1 air syringes, ultrasonic or other mechanical scalers, air abrasion, and polishing (Faculty of General Dental Practice 2020b; Izzetti et al. 2020). These procedures may generate infectious aerosols if they are carried out on individuals with COVID-19 and poses risk to the dental HCW and subsequent patients treated immediately after the AGP. Restrictions of AGP for patients under high risks category is, therefore, an

important control measure (Cochrane Oral Health 2020; Faculty of General Dental Practice 2020b; Izzetti et al. 2020).

An algorithm was formulated to assist in the decision-making for managing the patient (Figure 2). For low-risk patient, they may be treated for AGP or non-AGP. Non-AGP may be conducted in open procedural bays/cubicles and using standard PPE because the risk of transmission is relatively low. Generally, AGP should only be conducted in enclosed ‘pods’ to limit spreading aerosols to larger distance. Nevertheless, when AGP can be carried out with the use of rubber dams and high-volume dental aspiration, the AGP can be done in the open plan clinic environment. Standard PPE may be used especially when resources are limited.

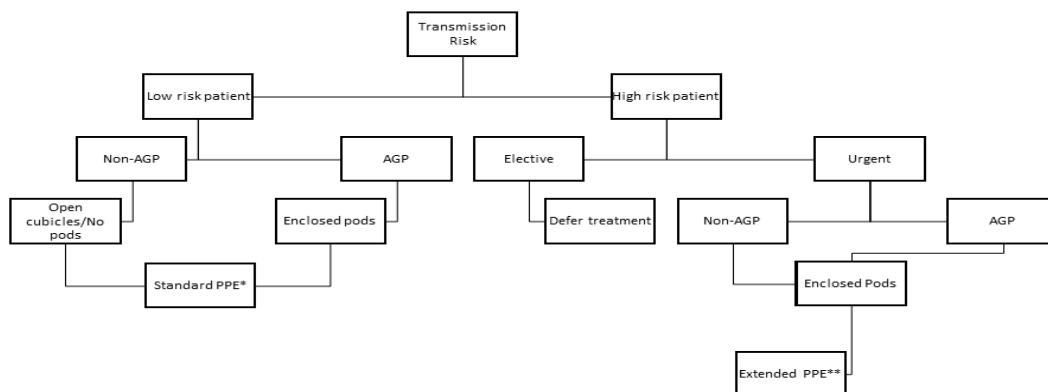


FIGURE 2. Algorithm of PPE selection based on transmission risk

*Standard PPE: head cap, surgical facemask, face shield, gloves and gown (use of plastic apron). N95 facemask instead of a surgical facemask may be considered if the treatment facility is in a high-risk red zone
 **Extended PPE: head cover, N95 facemask, face shield, gloves, gown and shoe cover

For high-risk patients, the dental undergraduate students are generally not encouraged to manage such patients. If the treatment is elective in nature, the patients are advised to defer treatment until their risk level is low. Nonetheless, if they require urgent treatment, the patient should be referred to a trained clinician and have the treatment done in enclosed 'pods' or isolated rooms. The HCW should use extended PPE for enhanced protection.

Table 3 shows examples of dental procedures according to case urgency. This is especially important for treatment decision in high-risk patients. Treatments

deemed to be urgent procedures can be addressed immediately with extra precautions (enclosed 'pods' and extended PPE). In the phase when pandemic curve is at its peak, elective procedures are to be postponed until the situation improves (Centers for Disease Control and Prevention 2020; Cochrane Oral Health 2020). However, there are some differences observed between classification of urgent dental care during COVID-19 pandemic by different professional bodies and countries (American Dental Association 2020; Scottish Dental Clinical Effectiveness Programme 2020).

TABLE 3. Examples of Aerosol Generating Procedures and Non-aerosol Generating Procedures in Dentistry

	Non-aerosol Generating Dental Procedures	Aerosol Generating Dental Procedures
Type of procedures	<ul style="list-style-type: none"> • Examination and risk assessment • Extra-oral dental radiography (minimise intraoral radiographs) • Oral hygiene instructions; smoking cessation and lifestyle modification advice • Supra-gingival scaling and supportive periodontal therapy using hand instrumentation • Extractions and suction 	<ul style="list-style-type: none"> • High/slow speed handpieces and powered instrumentation for surgical or restorative procedures • 3-in-1 air syringes • Supra- and subgingival instrumentation using powered instrumentation (e.g. sonic, ultrasonic or other mechanical scalers, air abrasion and polishing)
Example of urgent cases	<ul style="list-style-type: none"> • Severe dental pain that can be managed by medication or extraction • Maxillofacial/dental trauma that can be managed minimally • Mucosal pain • Dry socket • Pericoronitis • Periodontal abscesses (drainage using hand instruments) • Stable maxillofacial fractures • Fractured or defective orthodontic appliance • Post-operative bleeding • Painful temporomandibular dysfunction 	<ul style="list-style-type: none"> • Severe dental pain that requires endodontics or other AGP • Maxillofacial/dental trauma that requires AGP management • Removable dentures adjustments for radiation/ oncology patients. • Fractured or defective fixed prosthesis causing soft tissue injury • Acute periodontal disease (requiring the use of supra- and subgingival debridement using powered instrumentation) • Neoplastic lesions or potentially neoplastic lesions requiring immediate surgical intervention
Example of elective cases	<ul style="list-style-type: none"> • Initial or periodic oral examinations and recall visits • Scheduled orthodontic/prosthetic treatment without AGP • Extraction • Simple non-invasive fillings without use of AGP • Routine periodontal treatment with hand scalers • Chronic temporomandibular dysfunction management • Supportive periodontal therapy 	<ul style="list-style-type: none"> • Removable dentures adjustments or repairs • Asymptomatic fractured or defective restoration, fixed prosthesis or orthodontic appliance • Periodontitis • Aesthetic dental procedures • Restorative treatment of asymptomatic teeth • Orthodontic procedures with AGP • Routine dental scaling and prophylaxis • Replacement of missing tooth/teeth with fixed or removable prosthesis • Dental implant

*Note: This list is not intended to be exhaustive

Physical Distancing: Social distancing in reducing or slowing virus transmission refers to the act of increasing physical distance or reducing frequency of congregation in socially dense community settings (Ahmed et al. 2018). Physical distance between 1 and 2 meters is advocated in the waiting room. Patients are advised to be punctual and attend at their designated appointment time to minimise congestion in the waiting room. Chair arrangement in the waiting area should also be arranged in such to maintain physical distancing.

Procedural Mitigation: Prior to any intraoral procedures, patients are required to rinse using antimicrobial mouth rinses such as povidone iodine, hydrogen peroxide and chlorhexidine to potentially reduce the level of SARS-Cov-2 in the saliva. High volume dental aspiration and rubber dam are used when possible when doing AGP to reduce the spread of contaminated aerosol during treatment (Scottish Dental Clinical Effectiveness Programme 2021).

Extended Personal Protective Equipment: It is a standard practice for all dental HCW to wear surgical face masks while treating dental patients to protect from aerosols and splatters during normal circumstances. Donning of extended PPE is recommended for management of high-risk patients especially those requiring AGP. The use of respirators such as N95, filtering facepiece respirators (FFP2) or higher category respirators are recommended for high-risk patients and AGP as there is low certainty evidence that they offer superior protection against viral respiratory infection compared to surgical face mask in non-aerosol generating. It is also recommended to consider using N95 facemask if the treatment facility is located in a high-risk zone procedures (Bartoszek et al. 2020; Ministry of Health Malaysia 2020a).

Face shields have the advantage over-protective eyewear since they offer full face coverage and protect the face mask from splatter and droplets during dental procedure. Eye protection is also associated with lower risk of infection compared to without eye protection (Chu et al. 2020). Surgical cap has been recommended to be worn regardless of the level of risks. For extended precaution, head cover may replace surgical caps, which completely cover the hair, neck, head and sides of the face, beyond the limit of the face shield. Shoe covers are also recommended for high-risk patients as it protects the footwear from exposure to blood and bodily fluids during AGP. Aerosols generated afterwards may settle on the floor, thus the soles of the shoe may contaminate areas beyond where the procedures were done. Shoe covers should be removed

after the floor has been disinfected before leaving the AGP settings.

At the FoDUM, N95 masks are used by clinical staff/students if indicated such as for AGP. This is done to carefully ration the limited amount of N95, which had reduced in supply during the pandemic. Other staff and students are donned with 3-ply surgical face masks and face shields.

Physical surface cleaning: The 'pods' surface as well as the table top cubicles and dental chairs are surface cleaned using high level disinfectant solution containing Virusolve +® (Amity International, United Kingdom) (Amity Limited 2020). The sinks are cleaned using brush and household bleach, the spittoons are cleaned using nylon brush, and the floors are mopped with disinfecting solution. These processes are done after each patient.

DISCUSSION

LIMITATIONS

In institution like FoDUM, access to pre-treatment COVID-19 diagnostic investigation is limited due to financial constraints. Hence, we depend heavily on patient honesty in the pre-treatment screening. This method has its disadvantages because it overlooks asymptomatic COVID-19 positive individuals. These individuals are reported to have the viral nucleic acid yet do not present with classic symptoms (fever, dry cough, fatigue). Both asymptomatic and pre-symptomatic patients (who did not have symptoms but eventually experience the onset of symptoms) would not be identified through the screening questionnaire (Wu & McGoogan 2020). These patients may contact the faculty through the contact tracing protocol after having being diagnosed as being COVID-19 positive post-treatment. Therefore, the screening method is still inferior compared to the swab test/antibody screening. Studies are still looking into the risk of transmission of those without symptoms. Even though the risk of transmission of asymptomatic cases is lower than pre-symptomatic cases, the risk of transmission is still evident by these groups (World Health Organisation 2020a).

The soft opening of the faculty was conducted with improved SOP for health care services. The infection control protocols adopted were based on current local and international guidelines, which are constantly updated. It was made almost compulsory that all AGPs to be carried out in isolated rooms or 'pods' followed by fallow period prior to disinfection. Most dental procedures are AGPs,

and this had quickly used up the N95 masks, and disposable shoe- and head-covers, and fluid repellent isolation gowns, which can be costly over time. Due to physical distancing, disinfection and fallow time protocols that were enforced, we also noticed a reduction in the number of patients that could be seen per session. This may inevitably reduce the opportunity for patients to be treated.

Modifications of some treatment that are AGP to be non-AGP was adopted in limited situations, e.g., the use of hand scalers instead of ultrasonic scalers, hand excavators to remove caries and self-etch technique for bonding. In an attempt to resume all dental treatment, and to reduce cost, and unnecessary use of PPE in a recovering COVID-19 pandemic scenario, we followed local recommendation of extended PPE wear to be tailored to the patient's COVID-19 risk instead of type of procedure. This national directive (Ministry of Health Malaysia 2020a, 2020b), which is based on patient's COVID-19 risk, suggest that low-risk patients may undergo all types of dental procedures with standard PPE, while N95 mask wear is still recommended over standard surgical mask if the clinic is located within a high-risk area.

There was some dilemma encountered in deciding the SOP during this pandemic. Initially treatment centres that are within a high-risk area are limited to emergency treatments only. Nonetheless with the prolonged pandemic situation, this has affected the quality of life of patients who required elective treatments such as continuation of their on-going treatments (e.g., prosthesis, root canal, orthodontic treatment, fillings, periodontal therapy). These patients may be of low-risk but are unable to seek treatment in government treatment centres and teaching institutions due to the district COVID-19 risk restriction, which can be wide and impacts other areas within its jurisdiction and limits the number of patients that can be seen per day. Eventually, these patients had to seek treatment in private clinics because they were not able to wait for the government treatment centres and teaching institution services. Since the third wave in Malaysia has been prolonged, FoDUM decided to continue its services despite being in the high-risk area as signs of COVID-19 case reduction was not favourable. Therefore, teaching of psychomotor skills would continue but with added precautions in place.

There are some points that could be argued about the appropriate PPE attire for a particular situation. Many guidelines and recommendations have been made by national and global institutions, many of which are largely similar. Inconsistencies in recommendations can be confusing, therefore, it is best to refer to the national or

local guidelines as it closely reflects the current situation in a particular country. Clinicians also must keep abreast with the available guidelines as they tend to change with the publication of new evidences on COVID-19 related information. In the end, clinicians may require to apply their own clinical judgement as some situation might not fit into the proposed scenario in the guidelines and falls within grey areas.

CLINICAL ENVIRONMENT AND SUPERVISIONS

During the pandemic, students continue to work in pairs. They were instructed to plan beforehand the procedures to be done for that day and dental instruments should be prepared before the patient arrival in order to minimise the contamination in polyclinics by limiting the movements and prevent the need to change the PPE very often. This would prevent wastage thus reducing environmental burden. One dental nurse is allocated for the student groups in case they need any instruments in the middle of the treatment provision. Students were advised to remove the PPE at the end of the treatment.

With regards to environmental mitigation after AGPs, clearance of the suspended infectious particles in the air is dependent on the mechanical/natural ventilation and air change per hour within the room. One air change is estimated to remove 63% of airborne contaminants (Coia et al. 2013). Based on the area size, ceiling height and air conditioner type in the polyclinic, air change per hour was calculated. During the pandemic, an interval period of 1 hour between a session after each AGPs was practiced ('Dental Fallow Time Calculator launched' 2020).

Before the pandemic, it was recommended the clinical supervisor to student ratio to be 1:5 or 1:6 (Anderson et al. 2011; Malaysian Qualification Agency 2016). However, due to mitigation measures for clinical supervision during the pandemic, in the FoDUM, the clinician to student ratio was reduced to 1:1 or 1:2. This contributed to the increased of academicians and auxiliary staff workloads, which eventually led to shortage of manpower. This approach also led to the excessive use of PPE.

CHALLENGES AND IMPLICATIONS

The major priority for all dental institutions is to safeguard the wellbeing of staff, students and patients while consistently delivering quality dental education and services. During the pandemic, several challenges were experienced in our institution when clinical teaching resumed such as lack of funding, shortage of manpower and limited number of clinical spaces. It is

not surprising that many dental institutions are currently going through heavy financial burden throughout the pandemic globally. As the national budget is expected to focus generally on fighting the spread of disease through efficient healthcare delivery while salvaging the country's economy, dental institutions are expected to face gloomy situation due to anticipated reduced budget allocations, loss of generated income from academic fee and clinical services as well as additional cost incurred from the modification of clinical settings for mitigation purpose and procuring PPE.

Mitigation measures such as installing HEPA filters, negative pressure rooms, pods for polyclinics, incorporation of COVID-19 testing facilities for suspected patients in the faculty and procuring additional PPE would relatively incur cost to the faculty expenditure. As in most institutions, our faculty had limited time for executing the mitigation measures while trying to maintain the education quality at the early phase of the pandemic. Ensuring the final year students to graduate on time was indeed a very challenging task. National dental clinical requirements were revised (Dental Dean Council 2020) and academic semesters were extended to allow the students to complete the clinical competency while utilising the semester break for other clinical teaching and learning activities.

Another problem our faculty faced was prioritising which patients would be seen first in the limited number of clinical spaces and clinical slots. In addition, the number of patient's backlog increases as a result of incomplete students' cases. For example, treatment of specialties with frequent involvement of AGPs such as periodontics, prosthodontics, endodontics, and paediatric dentistry had a high number of patients with 'on-going' treatment that needed to be completed. The incomplete cases by final year students who had already achieved their minimal requirement were taken over by postgraduates or lecturers where appropriate as a measure for continued patient care as the succeeding undergraduate students who were expected take over the cases were delayed from returning due to MCO restrictions. Prioritisation conducted was based on medical history, urgency of treatment and patient ability to come for appointment. Similar approach was reported by other dental school in USA (Glick et al. 2020).

Positive implication includes the development of mobile application by the university as a centralised online platform to support staff that were assigned to work from home to log in their work and other duties (University of Malaya 2020). The applications also include daily health declaration records by staffs and students, which enables health assessment risk prior to entering the institution.

Those at risk would then be advised to seek medical attention and not allowed to enter the premises until permitted by the authorities. In addition, faculty members previously resistant to technology-oriented learning have better adaptation to the new culture of online learning and assessment innovations. All these new approaches during pandemic disruption have the potential to move dental education into a new era.

Outside the clinical environment, the faculty also faces the challenges for maintaining the SOP amongst students to prevent workplace-based transmission. Common areas such as resting areas, elevators, and prayer rooms are marked with physical distancing labels while they also receive frequent reminders by conscientious members of the faculty to follow the SOP. Lecture halls and seminar rooms are opened with tables and chairs arranged with adequate physical distancing to provide resting areas for the students during lunch hour. Continuous monitoring by the Infection Control Committee is done through regular reports that are tabled to academic staff to highlight areas for improvement. In the rare event where students disregard the SOP and becomes negligent despite warning, temporary cessation of student clinical session is enforced for reflection and reinforcement of SOP adherence.

CONCLUSION

COVID-19 has indeed imposed a great toll towards the delivery and implementation of dental teaching around the globe. The constant pressure to produce adequate and quality teaching for our students should not override the important needs of preparing sufficient protections and safety towards the students, academicians, as well as every supporting auxiliary staff. Within the limited fund and resources, however, our faculty has managed to resume to its new normal clinical environment in ensuring these students are available to graduate on time with sufficient clinical training. The online platforms have no limits in providing the ever-ready forms of teaching options while innovation process and creativity has allowed the faculty to lead an exemplary method in continuing its standards of delivering the best dental training throughout the country.

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