

Short Communication

Guidelines for innovation in dental education during the coronavirus disease 2019 pandemic

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Abstract: During the current coronavirus disease 2019 (COVID-19) pandemic, dental education and training requiring face-to-face interaction must prioritize infection prevention and the safety of students, staff, and patients. In July 2020, the Association for Dental Education, Asia Pacific (ADEAP) published safety guidelines for safe dental education during the COVID-19 pandemic. These guidelines summarize ADEAP recommendations for classroom-based courses, reopening of simulated training courses and dental clinics, and provision of clinical skills training courses in dentistry during the COVID-19 pandemic. They have been formulated to ensure the safety of students and teaching staff, dental auxiliary staff, and patients. However, the present guidelines are considered appropriate only when the number of COVID-19 epidemic cases has been significantly reduced, i.e. when the epidemiological curve has flattened in the area concerned. The criteria for lifting restrictions on activities should be consistent with relevant jurisdictional guidelines.

Keywords; COVID-19, dental education, guideline

Introduction

The first case of coronavirus disease 2019 (COVID-19) is believed to have occurred near Wuhan, P. R. China, around December 2019. The virus responsible for COVID-19 is a novel coronavirus [1]. The World Health Organization declared COVID-19 a pandemic on March 11, 2020, and the disease has greatly affected people around the world because of its high infection rate. Many of us are forced to live with multiple infection control measures and physical distancing to prevent COVID-19 transmission, which has been linked to droplets and aerosols passed by face-to-face contact [2].

The pandemic has markedly affected economic, cultural, and education activities, and dentistry/dental education is no exception. Dental education activities can be broadly divided into lectures/tutorials and problem-based learning (PBL) interactions, simulated training courses, and clinical skills training. During this pandemic, lectures have been given online, to provide a structured learning progression for all dental students [3]. In most Asian Pacific and European countries, simulated training and clinical skills

training courses for dental students were suspended or postponed [4,5]. To exchange information and experiences that enhance educational offerings of greatest importance to dental education, it was deemed necessary to formulate clear COVID-19 guidelines that safely facilitate simulated training courses/clinical skills training courses, as well as lecture courses, during the current pandemic. Furthermore, such guidelines might prove helpful in addressing future pandemics. With this in mind, the Association for Dental Education, Asia Pacific (ADEAP) developed and published guidelines for safe provision of dental education during the COVID-19 pandemic.

Development of guidelines for dental education

On the May 13, 2020, the ADEAP decided to establish an Asia Pacific-wide committee of academics to develop safety guidelines to facilitate dental education during the COVID-19 pandemic. The committee comprises 15 experts in dental education from 12 dental schools (The University of Sydney, The University of Hong Kong, Sichuan University, University of Indonesia, Tohoku University, Seoul National University, Yonsei University, International Medical University, Manila Central University, National University of Singapore, National Yang-Ming University, and Chulalongkorn University) in 10 countries and regions (Australia, China, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand) in the Asia Pacific region. The committee was divided into three working groups (WG) (five committee members per group), and each WG was assigned a lead academic. WG 1 worked on guidelines for lectures/tutorials and PBL interactions, WG 2 developed guidelines for safe simulation training, and WG 3 focused on guidelines for safe management of clinical skills training. Each group created a WG draft, which was reviewed and revised by all members of the committee. The final versions were published on the official website of the ADEAP on July 3, 2020.

Discussion

The content of the guidelines is divided into four main sections: general safety protocols, protocols to be observed before entering the school building and classroom/SIM clinic/teaching hospital, protocols to be observed during a session, and protocols to be observed upon completion of the session. Several protocols are included in all sections (Tables 1-3). The general safety protocol section mainly pertains to infection prevention measures that should be observed in our daily lives as students and staff, and in schools, such as maintaining a physical distance of at least 1.5 m between individuals (July 6, 2020; <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>), frequent hand sanitization, and essential use of certain personal protective equipment (PPE) e.g. wearing a mask (April 6, 2020; <https://www.who.int/publications/i/item/>

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Table 1 Guidelines for dental education during the COVID-19 pandemic—part 1: lectures/tutorials and PBL interaction*

| Sections | Recommendations |
|---|--|
| General | <ol style="list-style-type: none"> When implementing lecture/tutorials and PBL interaction sessions, schools must take steps to avoid putting students being in enclosed spaces, with poor ventilation, for extended periods of time. At all times, staff and students should avoid confined spaces where significant numbers of people are in close proximity. All items and equipment (phones, computers, etc.) should not be shared and should be thoroughly disinfected. Ideally, phones should not be brought into the classroom by students unless prior approval is given by their educator. If approval is given, the device should be encased in a removable plastic bag for the duration of the session and disinfected after use in the classroom. Thoroughly disinfect all contact points (doorknobs, elevator buttons, etc.) and refrain from using the elevator to travel to the session. Hand sanitization is mandatory for students and teaching staff, upon arrival at school, before/after learning activities, and upon returning home. Hand sanitization should be either of the following. If hands are visibly dirty, they should be washed thoroughly with soap and water for more than 30 s. Hands should then be wiped dry, ideally with a paper towel. Hand sanitization can also be achieved by a locally approved hand sanitization lotion or foam. This should be provided for use in all learning spaces and is ideally used when the individual's hands appear unsoiled. After hand disinfection, students and staff should avoid touching their face and head, to prevent recontamination. Students and teaching staff must wear a mask when outdoors, indoors, and while talking with another person. Always maintain a safe physical distance (at least 1.5 m) between individuals in the classroom and outdoors. Scheduling of student sessions should be carefully considered, to keep contact study hours as short as possible. The classroom should be ventilated regularly. If the room is mechanically ventilated (air conditioning system, mechanical ventilation system), the ventilation system should be in constant operation. The ventilation value should exceed 30 m³ per person per hour. If the classroom does not have a ventilation system, ventilate the classroom by opening the window fully at least once every 30 min for at least 5 min. Body temperature checks must be undertaken for all students and staff before they enter the classroom. Should their body temperature exceed 37.3°C, students will be asked to wait and rest, after which their temperature will be retaken. If they again record a body temperature exceeding 37.3°C, they should be sent for COVID-19 testing. Students and staff must self-assess their health status daily for COVID-19-related symptoms. These results should be reported to the faculty member in charge, in the event any COVID-19 signs or symptoms present themselves. The student should proceed for COVID-19 testing and self-isolate until a result has been determined. Those who have even the mildest of symptoms must work from home and not attend school for any educational engagements. The school should create and maintain an attendance register with emergency contact details for each student and staff member to facilitate contact tracing, should the need arise. Avoid public transportation (trains, buses, taxis, etc.) as much as possible and actively use methods that do not involve use of public transportation (bicycle commuting, walking, etc.). If using public transportation, wear a mask and limit unnecessary conversation. If possible, carry hand sanitizer. Hands should be sanitized before and after using public transport or when deemed appropriate. Observe relevant local laws and regulations and take measures necessary to ensure the safety of the school and hospital. The content of classroom-based courses must meet the minimum requirements of each university and the accreditation authority for the country. |
| Before entering the school building and classroom | <ol style="list-style-type: none"> Before entering the school building, students should be screened for COVID-19 by answering the screening questionnaire. Students who have a fever (>37.3°C) or symptoms listed on the COVID-19 screening questionnaire, and those who have had close contact with a confirmed or probable case of COVID-19 or travelled overseas or from a high risk jurisdiction within the last 14 days, cannot enter the school building. These students should be referred to the closest COVID-19 screening facility for testing. Ideally, students should enter the school building through a separate entrance, especially if the school and hospital are in the same building. The facility entrance and exit should be monitored to ensure entering students/staff do not come into close contact with exiting individuals before being screened for COVID-19. Before entering the school building, students should wash their hands if they appear soiled. Otherwise, use, at a minimum, an approved alcohol-based hand rub. Students must put on a mask before entering the school building, if not already wearing one. If the school and a hospital are in the same building, students should ideally enter the classroom separately to ensure that they have no close contact with any patient population. For teaching staff, please follow the specific infection control guidelines of their respective university and jurisdiction. |
| During the session | <ol style="list-style-type: none"> The student workstation, e.g. student bench, and equipment to be used during a session will need to be wiped down with alcohol/effective sanitizer before each session commences. In the classroom, student numbers must be limited to facilitate safe physical distancing. The physical distance between all persons should be maintained at a minimum of 1.5 m. Seats should be positioned at least 1.5 m apart. To identify safe physical distancing, schools should mark available areas, designated seating, etc., in a way that is easily understood by students and staff, e.g. by using removeable floor or wall signs. During a session, always maintain safe physical distancing, with no moving around the classroom during the session, unless directed to do so by a staff member. All students and staff must wear masks throughout the entire teaching session. If a student feels unwell during a lecture, they must notify a staff member. Their temperature will be retaken, and the screening questions will be asked again. If the temperature exceeds 37.3°C or the student answers "Yes" to any of the screening questions, the student will be sent for COVID-19 testing. The remaining students will be sent home for self-quarantine immediately. If there is a confirmed positive result, the remainder of the class must undergo COVID-19 testing and self-isolate until they receive their results. |
| Completion of the session | <ol style="list-style-type: none"> All student/staff-contacted surfaces and equipment must be wiped with alcohol or an effective sanitizer. Remove and safely dispose of all masks and change into a new face mask. All staff and students must undertake hand hygiene, i.e. wash hands with soap and water or use an alcohol-based hand rub, before leaving the classroom. Students should leave the school immediately after their session. This may vary by jurisdiction. |

*Guideline for dental education during the COVID-19 pandemic. <https://adeap.org/covid-19-committee>

rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages). Students and staff should avoid public transportation whenever possible and actively use methods that do not involve use of public transportation to travel to and from their training institution. The school/educational institution needs to regularly disinfect facilities and contacted surfaces and regularly ventilate rooms. In addition, the school is responsible for using the COVID-19 screening questions (Table 4) for daily health assessment of student and staff for COVID-19-related symptoms. The guidelines define an unhealthy body temperature as 37.3°C or higher. However, jurisdictions/countries differ in how they regard body temperature as a potential COVID-19 marker during screening (March 25, 2020; <https://www.ada.org.au/Campaign/COVID-19/Guide-to-Managing-COVID-19/ADA-Managing-COVID->

19-Guide-v-2.aspx). From an epidemiological perspective, COVID-19 is highly infectious, and the criteria adopted by the committee were therefore stricter. The committee recognizes that jurisdictional/country guidelines supersede those of the ADEAP.

When entering a school/institution or hospital before the start of an in-person teaching session, students and staff must be screened for COVID-19 by answering a screening questionnaire (Table 4) and having their temperature taken. If any student or staff member has a fever (>37.3°C) or reports symptoms listed in Table 4, they should not be allowed in the school building, institution, or teaching hospital, thus excluding them from in-person instruction.

During the session, staff and students must maintain a physical distance of at least 1.5 m. In the case of simulation training and clinical skills train-

Table 2 Guidelines for dental education during the COVID-19 pandemic—part 2: simulated training*

| Parts | Recommendations |
|--|---|
| General | As specified in Part 1, above. |
| Before entering the school building and SIM clinic | The following item has been added to the items in part 1. 1. Students should don PPE (medical gowns, surgical masks, glasses/face shield, and gloves) in the dedicated changing room of the school. In the changing rooms, student numbers must be limited to maintain safe physical distancing. The procedures utilized will vary by country and depend on the task taught, e.g. if aerosols are being generated. |
| During the session | The following items have been added to the items in part 1. 1. The materials and equipment to be used for each simulation session should be placed on the student's bench before teaching commences. 2. All students and staff must always wear PPE (medical gowns, surgical masks, glasses/face shield, and gloves) during the session. This will vary by jurisdiction and depend on whether aerosols are being generated during the procedure being taught. |
| Completion of the session | The following item has been added to the items in part 1. 1. Finally, students should then return to their changing room, observing physical distancing, change clothes, put on a new face mask, and leave the school immediately. This will vary by jurisdiction. |

*Guideline for dental education during the COVID-19 pandemic. <https://adeap.org/covid-19-committee>

Table 3 Guidelines for dental education during the COVID-19 pandemic—part 3: clinical skill training*

| Parts | Recommendations |
|---------------------------------------|---|
| General | The following items have been added to the items in part 1. 1. To screen febrile patients, a pre-diagnosis and triage system should be established in the teaching hospital setting. * Telephone triage all patients in need of dental care. Assess the patient's dental condition and determine whether the patient needs to be seen in a dental setting. Use teledentistry options as alternatives to in-office care. 2. The clinics should be cleaned by wiping floors with 500 mg/L chlorine disinfectant twice daily. |
| Before entering the teaching hospital | The following items have been added to the items in part 1. 1. Before entering the teaching hospital, students and patients should be screened for COVID-19 by answering the screening questionnaire and triage. Students and patients who have a fever (>37.3°C) or symptoms listed in Annex 1, those who have had close contact with a confirmed or probable case of COVID-19, and those who have travelled overseas or from a high-risk jurisdiction during the last 14 days cannot enter the teaching hospital. These students and patients should be referred to the closest COVID-19 screening facility for testing. 2. Ideally, students/staff and patients should enter the teaching hospital through separate entrances. 3. Students should put on personal protective equipment (PPE) (such as medical gowns, N95-grade respirators or masks, goggles, face shield, and gloves) in the dedicated changing room of the hospital. In changing rooms, student numbers must be limited to maintain safe physical distancing. |
| During the session | The following items have been added to the items in part 1. 1. The materials and equipment to be used for each patient appointment should be available, easily accessible, and protected from aerosol contamination. 2. All students and staff must always wear PPE (medical gowns, N95-grade respirators or masks, goggles, face shield, and gloves) during the session. If N95-grade respirators or masks are not available, use both a dental (surgical) mask and a full-face shield. No more than 4 h of wear of any one mask should be allowed. Respirators and masks should be changed more frequently if they become wet. 3. Before treatment, patients should gargle with a mouthwash containing effective antiseptics such as povidone-iodine (1%), cetylpyridinium chloride (0.05% to 0.10%), essential-oil components, or chlorhexidine digluconate (0.12% to 0.2%), to reduce the number microorganisms in the oral cavity during treatment. 4. If possible, use disposable instruments and supplies for patient treatment. 5. If any PPE materials (medical gowns, N95 respirators or masks, goggles, face shield, and gloves) are contaminated with blood, bodily fluids, or secretions during treatment, they should be immediately replaced or disinfected, as appropriate. 6. Masks, goggles, face shields, and any other PPE item that is exposed to heavy aerosol contamination should not be touched during treatment. 7. Frequent saliva aspiration with a vacuum or de-saliva tube can reduce production of droplets and aerosols during treatment. When using a de-saliva tube, avoid simultaneous use of a vacuum to prevent cross infection due to reflux. * Avoid aerosol-generating procedures whenever possible. Avoid the use of dental handpieces and the air/water syringe. Use of ultrasonic scalers is not recommended. Prioritize minimally invasive/atraumatic restorative techniques (hand instruments only). * If aerosol-generating procedures are necessary for dental care, use four-handed dentistry, high evacuation suction, and dental dams to minimize droplet spatter and aerosols. The number of DHCP present during the procedure should be limited to those essential for patient care and procedure support. |
| Completion of the session | The following items have been added to the items in part 1. 1. All staff and students must undertake hand hygiene, i.e. wash hands with soap and water or use an alcohol-based hand rub, before leaving the student clinic. * Hand hygiene after removing PPE is particularly important to remove pathogens that might have been transferred to bare hands during the removal process. 2. After use, disinfect the goggles and face shield with 75% ethanol and dry them thoroughly before reuse. 3. Finally, after patient treatment has been completed and the student clinical session as been completed, they should go to their changing room (while observing physical distancing), change clothes, put on a new face mask, and leave the teaching hospital immediately. This may vary by jurisdiction. |

*Guideline for dental education during the COVID-19 pandemic. <https://adeap.org/covid-19-committee>

ing sessions, all students and staff must wear PPE (medical gowns, surgical masks, glasses/face shield, and gloves) for the entire session (Tables 2, 3). However, this will vary by jurisdiction and depend on whether aerosols are generated during the procedure being taught. The regulations are stricter for clinical skills training, because of the necessity of direct contact with patients. In some situations, students may be required to wear an N95-grade respirator or mask, and PPE will need to be replaced for each patient interaction. The specific infection control procedures of each school/institution and jurisdiction must be followed when treating patients. Because of the need for patient contact, procedures related to clinical skills training must be strictly observed. In clinical skills training, frequent aspiration of saliva, with high volume and low evacuation, can reduce production of droplets and aerosols during patient treatment (Table 3). If aerosol-generating procedures are necessary for dental care, the dental operator should employ four-handed dentistry, high evacuation suction, and dental dams to

minimize droplet spatter and aerosols. During the session, staff should also be mindful of the health status of their students (Tables 1-3).

After finishing the session, all surfaces and equipment contacted by students must be wiped with alcohol or an effective sanitizer. Goggles and face shields should be disinfected with 75% ethanol and dried thoroughly before reuse (Table 3). Staff and students must remove and safely dispose of medical gowns, surgical masks, and gloves and change into a new face mask. All students should leave the school immediately after instruction.

The ADEAP guidelines are not intended to restrict educational activities; nor are they intended to be mandatory for all countries. Instead, they were developed as a starting point for the safe provision of dental education during the current pandemic. The epidemiological profile of COVID-19 differs by country/jurisdiction; thus, the relevant authorities must make the final decision regarding what infection control measures are required. The ADEAP guidelines should be considered safe only when the number

Table 4 COVID-19 screening questions*

| Name: () | Year Level: () | Student ID No.: () |
|--|-----------------|---------------------|
| Have your body temperature checked, then circle your response to the following questions before entering the hospital, school building, classroom, or clinic. | | |
| If you answer "Yes" to any of the following questions or have a temperature higher than 37.3°C, speak to a staff member immediately for directions and advice. | | |
| Body temperature | | °C |
| Do you have a cough? | | Yes / No |
| Are you short of breath? | | Yes / No |
| Are you producing sputum? | | Yes / No |
| Do you have a sore throat? | | Yes / No |
| Are you experiencing any loss of smell or taste? | | Yes / No |
| Do you have a runny nose? | | Yes / No |
| Do you have muscle aches? | | Yes / No |
| Do you have a headache? | | Yes / No |
| Do you have diarrhea or nausea? | | Yes / No |
| To the best of your knowledge, have you had close contact with a confirmed or probable case of COVID-19 during the last 14 days? | | Yes / No |
| Have you travelled overseas or from a high-risk area during the last 14 days? | | Yes / No |

*Guideline for dental education during the COVID-19 pandemic. <https://adeap.org/covid-19-committee>

of COVID-19 epidemic cases has been significantly reduced, i.e. when the epidemiological curve has flattened in the jurisdiction in question. The criteria for lifting restrictions on activities should accord with national guidelines for each jurisdiction/country. Before reopening and continuing in-person educational activities, schools and institutions need to collect the latest epidemiological evidence and prioritize protection of their students and staff.

The ADEAP recognizes that the current COVID-19 pandemic makes it extremely challenging for schools/intuitions to continue dental education as it was before the pandemic. Every school/institution needs to review their curriculum to identify new and innovative ways to maintain high educational standards. The content and criteria of education must meet the minimum requirements of universities and national accreditation authorities. Further, dental schools/institutions must observe relevant local laws and regulations and undertake measures necessary to ensure the safety of all staff, students, and patients attending their school, institution, or hospital. Although the ADEAP views dental health as integrated with general health, dental education differs from medical education. Specific equipment and physical conditions are required for face-to-face treatment in dentistry. The ADEAP guidelines for dental education may need to be revised in the future, and the ADEAP will continue to update these guidelines as new evidence emerges.

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Conflict of interest

The authors declare no conflicts of interest associated with this manuscript.

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