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GUEST EDITORIAL

Are dental schools adequately preparing dental students to face outbreaks of infectious diseases such as COVID-19?

As of April 23, 2020, the current outbreak of 2019-novel coronavirus (2019-nCoV, also known as SARS-CoV-2) has caused >2,622,571 confirmed cases of coronavirus disease 2019 (COVID-19) in more than 185 countries, and has caused >182,359 deaths globally.[1] The World Health Organization has now officially declared it a pandemic.[2] The case fatality rate of COVID-19 is variable across countries, ranging from as high as 9.5% in Italy to as low as 0.08% in Israel.[3] Most of the patients of COVID-19 are asymptomatic or only mildly symptomatic but discharge large amounts of infectious viral particles in the early phase of infection. This poses an enormous challenge for containing the spread of the infection. The basic reproductive number of COVID-19 at the early stage is estimated to be between 1.4 and 3.9. This indicates that 1 patient can transmit the disease to 2 to 4 other people, and this rate is higher than severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). Until the middle of April 2020, >9000 healthcare workers in the United States have been infected by 2019-nCoV, accounting for 19% of total number of patients data available with the CDC.[4]

Prior to the present pandemic of COVID-19, there have been multiple large-scale epidemics and pandemics of other viral respiratory infections like seasonal flu, Spanish flu (H1N1), SARS, MERS, and others. The common transmission routes of these respiratory viruses include direct transmission (cough, sneeze, and droplet inhalation) and contact transmission (contact with oral, nasal, and eye mucous membranes). This mode of transmission, especially from asymptomatic or mildly symptomatic patients, puts dental professionals at an increased risk for contracting these viruses from dental patients, as dental practice involves face-to-face communication with the patients and frequent exposure to saliva, blood, and other body fluids.[5] A study by Davies et al.[6] on 50 practicing dental surgeons found that they had a significantly elevated prevalence of antibodies to influenza A, influenza B, and respiratory syncytial virus compared to the controls. More dentists than controls also carried antibodies to adenoviruses, although this difference did not attain statistical significance. The authors concluded that dentists were at occupational risk of infection with respiratory tract viruses.[6]

All these outbreaks in developed as well as developing countries has focused the world's attention on the critical need for adequate and proper utilization of personal protective equipment (PPE) during the provision of care by health workers.[7] In addition, these outbreaks also point to the larger ethical problem of the potential impact of lapses in infection control compliance in the dental setting.[8]

During the current pandemic of COVID-19, as the dental professionals are at the top of the pyramid of healthcare professionals at risk, dentists as well as dental students seem to be facing various challenges to cope up with the current pandemic. Patient handling has become strenuous. Tele-counseling and triaging of patients have become necessary along with informing the patients about the need of appointment cancellation. The need of the hour seems to be, to carry out emergency dental treatment only after telephone triage, risk-assessment, and after adopting a low-transmission approach of infection. In addition, dentists need to apply management education to their practice. They need to lay-off staff with pay guarantee, keep them working for few hours with reduced pay, or discharge them. For personal health, dentists need to avoid unnecessary contacts, wear PPE while examining and working on patients, and adopt universal precaution along with basic infection control measures.

In my view, dental education can play an important role in the training of dentists, helping them to adopt adequate knowledge and attitudes related to infection control measures. But are our dental schools adequately preparing the future dentists to face the challenges of these outbreaks of respiratory infectious diseases? The answer is "yes" as well as "no" depending on the country and curriculum of the dental school. In many countries, dental students may be in better stead than practicing dentists in relation to infection control practices. However, in many dental schools, especially in resource-constrained countries, dental students are probably more susceptible to these viral respiratory illnesses because of the similar exposure profile, but with poorer knowledge and lack of practice of infection prevention.

Although, the current dental curriculum at most dental schools does address basic infection control, especially, risk from blood-borne infections such as HIV and hepatitis B virus (HBV), and recommends Universal Precautions for preventing these blood-borne infections; droplet and air borne infections appear to be seldom addressed. The infection control information as well as practice in dental schools of many

countries is apparently not adequate. In a U.S. survey to determine the content of infection control information in the dental curricula, it was found that most schools did not have an independent course and only used classroom lectures and clinic demonstrations to teach infection control.[9] In another study conducted among dental students of India, the level of knowledge and practice of infection control measures was found to be poor.[10] This leads to inadequate practice of infection control. A systematic review that included studies from Brazil, United Kingdom, and France, studying the adherence of educators and students in academic dental institutions to hand hygiene procedures, found that hand hygiene among dental students did not even reach 50% of the total number of students.[11]

I believe, that to improve the education about containment of infectious diseases, dental schools should consider adopting a high standard infection control-monitoring policy by establishment of infection control committees and units. These committees, with active involvement from the faculty and school deans, are likely to lead to improved sanitation, asepsis, biohazard control, and biohazard waste disposal.[9] An exemplary display of infection control measures by the dental school faculty will work as a guideline for students to assimilate such practices, even in resource-constrained countries. Student immunization against infectious diseases before they enroll into dental schools might further strengthen the efforts to protect the students. Dental schools ought to include infection control teaching either as an independent course or as a significant part of other courses. The students should be taught about basic principles of infection epidemiology, susceptibility, modes of transmission, risk factors, signs and symptoms of infection, laboratory diagnosis, preventive measures including droplet and airborne precautions, eye protection, and health promotion. Students need to be educated not only by lectures and demonstrations but activities, such as workshops, skits, and training camps may also add an extra dimension to student education in infection control measures. Dental schools may launch online courses for basic infection control or smart phone applications, which may keep the students updated with latest information about infectious diseases and the preventive methods. Dental schools should start evaluating students for their infection control practices; grade, mark, and monitor the students according to their infection control practices. A faculty may be put in-charge of the appropriate implementation of school guidelines, and students should face the consequences in case they fail to implement them.

As only modest data are available as guidelines for prevention of COVID-19 for dental practitioners, dental students often look to the Internet for information, but such information is often inaccurate; therefore, it is best to adhere to safety instructions issued by the governing bodies. The WHO and government bodies have been issuing guidelines and disseminating information about preventive measures for COVID-19. Dental school faculty should further circulate these guidelines among dental students; make plans and outlines of important considerations to be strictly implemented during this ongoing pandemic as well as in any other similar future scenarios.

Dental professionals providing oral health care to the patients, must base their practice on ethical principles for implementing the oral health care. Infection control practice provides a case study of application of ethical principles and should be followed with vigilance. Each infection control practice is related to the 5 principles of health professions ethics: autonomy, non-maleficence, beneficence, justice, and veracity.[8] While these principles may overlap, they form the basis of professional ethical conduct. These principles apply to individual health practitioners, who are increasingly working to improve inter-professional association for patient-centered care, and to warrant safe dental care delivery. These principles must be applied regularly and the use of a standard checklist may help with conforming with standard infection control.[8]

During the current COVID-19 pandemic, public health measures, such as lock-downs and social distancing, as implemented by the respective governments of the countries, are the most important actions for control and mitigation of pandemic. However, it is too early to say whether these measures alone will be effective in completely eradicating COVID-19 from the community, or we will have to learn to live with some persistent infection becoming endemic in the community, until at least when vaccination is available and implemented. We also need to asses the tally of the effect of the pandemic on dental students, dental residents, and dental professionals, during the lock-down period and also when the lock-down eases. However, the modifications to the dental curriculum as suggested above addresses more than just the current COVID-19 pandemic; it will also prepare dental schools to face any such future infectious disease epidemics.

As dental education proceeds into the 21st century, dentistry will have to assume a path that is more convergent with than divergent from medicine. In my viewpoint, infection control education needs to be expanded in the dental curriculum itself and students of every dental school should be trained adequately to protect them and prevent the infection from disseminating even before they see their first patient. Our dental graduates need to be not only excellent dentists but also thoughtful, independently practicing healthcare professionals providing oral health within the context of systemic health infection prevention.[12]

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