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The potential transmission of COVID-19 during routine dental surgery

Corona Virus Disease 2019 (COVID-19) caused by the novel coronavirus (SARS-CoV-2) can result in acute respiratory illness, hospitalization, and death, and is highly infectious. The spread of this virus has caused a global pandemic. The transmission routes of SARS-CoV-2, especially the role of environmental transmission, are being established. There is now a significant body of evidence supporting the airborne transmission of the virus in microscopic droplets of moisture, which are considered to be airborne particulate matter [1,2].

Dentistry routinely involves the use of surgical equipment that generates mist clouds. These clouds mostly consist of filtered water that is expelled from the surgical devices, however, must also include a component of human mucus. The mist cloud therefore provides a potential pathway of virus transmission by these airborne droplets. In addition, the dental surgery requires the dentist and dental assistants to work in close proximity to the patient. The airborne droplets generated during surgery will also settle on surfaces in the room, presenting a longer-term risk. During the pandemic, the dental guidelines have included only treating urgent dental cases, increased room ventilation, cleaning of surfaces between treating patients, and a ‘fallow’ time between patients. We are investigating the nature and extent of the mist clouds, the impacts on the mist cloud by opening doors and windows during surgery, and the time required for airborne moisture levels in the surgery to return to an ambient level.

A Microdust Pro airborne particles monitor has been used to measure the surgical mist clouds. The device works by light scattering, and our pilot results show that the device is highly suitable for this research with a real-time response noted for surgical procedures generating mist clouds, and the effects of opening windows and doors. Initial results did not show a meaningful difference in the mist cloud between 0.5M and 2M between mist generation and monitoring. A CO₂ dissipation system is currently being employed as a proxy to determine empirically the amount of time required for a meaningful ‘fallow’ period. It is clear that these cloud mist and dissipation parameters will vary depending on a number of factors including the size, shape, and set-up in the surgical rooms.

It is concluded that further research is urgently required into the potential transmission of COVID-19 in water droplets generated during dental surgery.

Keywords: Dental surgery, Airborne droplets, COVID-19

References

[1] Tung, Nguyen Thanh, Cheng, Po-Ching, Chi, Kai-Hsien, Hsiao, Ta-Chi, Jones, Timothy, BéruBé, Kelly, Ho, Kin-Fai and Chuang, Hsiao-Chi 2021. Particulate matter and SARS-CoV-2: a possible model of COVID-19 transmission. *Science of the Total Environment* 750

[2] Cao, Yaxin, Shao, Longyi, Jones, Tim, Oliveira, Marcos L.S., Ge, Shuoyi, Feng, Xiaolei, Silva, Luis F.O. and Berube, Kelly 2021. Multiple relationships between aerosol and COVID-19: A framework for global studies. *Gondwana Research* 93 , pp. 243-251.