Aerosol reduction urgency in post-COVID-19 dental practice

Aerosols are essentially suspensions of liquid droplets or fine solid particles in air. The three potential sources of aerosols in dental settings are dental instruments, saliva and respiratory sources, and the operative site.[1] Although attempts have been made in the past to compare the different types of aerosol reduction mechanisms produced during dental procedures, especially when using ultrasonic scaling,[2] aerosol management in dentistry is currently in the limelight during this COVID-19 pandemic. Most of the aerosol production in clinical dental practice is via air-driven handpieces, ultrasonic devices, air polishers, and airborne-particle abrasion units. Aerosols are also possible in certain periodontal and oral surgical procures.[1] A high volume evacuator (HVE), with its large diameter (> 8 mm) helps in removing large volumes of air/splatter/droplets in a short amount of time, which reduces the amount of bio-aerosols up to 90%.[1]

Aerosols can be differentiated based on particle size. When the particle size is less than 50 µm, it is called splatter; in excess of 50 µm, it is termed droplet. If the particle size is less than 10 µm, the term droplet nuclei is used. In dental settings, 90% of aerosols produced are smaller than 5µm.[1,3] SARS-CoV-2 particle sizes vary from 0.06 to 0.14µm.[4] In one dry-field in vitro study conducted in 2012, it was shown that using rubber dam with HVE or a commercially available system reduced aerosol splatter significantly more than when using HVE alone.[5] Most studies prior to 2020 were focused on oral bacterial colonization; however, in the present situation, high transmissibility of SARS-CoV-2 must be taken into account. The spread is thought to be amplified via aerosols. Therefore, aerosol containment and complete reduction in the splatter must be a top priority as the world begins to heal and dental practices get back to normalcy.

Several adapters are commercially available that have combined illumination with an HVE adapter. They can be steam-autoclaved at temperatures up to 138°C/280°F. The existing guidelines from CDC refer to cleaning and heat-sterilizing aerosol-producing handpieces between patients and following standard disinfection procedures for overall infection control in the dental office.[3] For post-COVID-19 dental practice, there is an urgent need to address the aerosol reduction because SARS-CoV-2 can be spread via droplets and splatter. Detection of SARS-CoV-2 in the saliva of infected patients may indicate a salivary gland infection, but this could also be due to contamination from lung secretions via the nasopharynx.[6] Use of appropriate personal protective equipment (PPE), along with reduced splatter and use of high efficiency particulate arrestor (HEPA) filters (to arrest the most penetrating particle sizes – 0.3 µm) might be a winning combination for dental practitioners and patients. Although negative pressure operatories were initially mandated for dentists who treated emergency patients during the pandemic, state health authorities in the United States have removed this restriction if all other history and physical examination findings point to an asymptomatic patient. The dental profession should look at this important aspect urgently and come up with isolation and splatter reduction techniques that can be universally adapted.

In the Occupational Safety and Health Administration (OSHA) occupational risk pyramid for COVID-19, dentists fall under "very high exposure risk."[7] Aerosol reduction or mitigation should remain a top priority for the dental profession in the post-COVID-19 dental practice.

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