

### The MERS-CoV Outbreak: Challenges Facing the Dental Profession

Almost a decade after the devastating SARS epidemic, which infected more than 8,000 patients and causing more than 900 deaths, the outbreak of a novel coronavirus in the middle east poses a major threat to human health.<sup>1</sup> The middle east respiratory syndrome coronavirus (MERS-CoV) belongs to the genus *Betacoronavirus*, which was first isolated from Saudi Arabia in September 2012, in two patients with severe pneumonia.

The exceptionally high fatality rate (>50%) subsequent to MERS-CoV infection coupled with the behavioral uncertainties of this novel virus have understandably caused major concerns. The actual risk posed by the MERS-CoV on public health is not yet entirely known to the scientific community. The continued outbreak of new cases, the ongoing risk of transmission to humans, the recent reports of nosocomial outbreaks with transmission to healthcare personnel, and the increasing reports of cases imported outside Saudi Arabia raises a public concern.<sup>2,3</sup> The MERS-CoV appears to replicate efficiently in human respiratory tissues targeting alveolar epithelial cells and the endothelium of blood vessels in the lung, indicating a potential for disseminating beyond the respiratory tract.<sup>4</sup>

The most common symptoms of MERS-CoV infection were fever, cough and shortness of breath. Subsequently, the patients succumb to severe pneumonia and renal failure.<sup>5</sup> The syndrome has been so far clustered in the Arabian Peninsula with Saudi Arabia leading the bandwagon followed by United Arab Emirates (UAE), Qatar, Oman, Jordan, Kuwait, Yemen and Lebanon. Isolated cases have been reported from America, Europe (France, Italy and Greece) and Asia (Malaysia and Philippines), mainly with a history of travel to the Arabian region. As of June 2014, in Saudi Arabia alone, a total of 720 cases have been diagnosed with a death toll of 214, including several healthcare providers.<sup>6,7</sup> According to the ECDC, the global MERS total has reached 842 cases, 322 of them are fatal.

With the emergence of MERS-CoV, the threat of airborne disease as a potential occupational hazard to the dental professional resurfaces again. The question that arises here is that, should we allow such diseases to reach pandemic proportions before reassessing the existing infection control measures. With the shrinking list of antibiotics due to drug resistance and vaccines which were once hailed as the 'magic bullets', one must consider alternative ways to control such diseases at earlier stages.<sup>8</sup> The high fatality rate of 60% with comorbidities as stated by the world health organization (WHO) should ring an alarming bell to the dental professionals.<sup>9</sup> Since the modes of transfer and infectivity have not been completely understood specially at its prodromal and convalescent stages of the disease, the dental professional stands at the higher risk of exposure. Various reports have suggested its spread through aerosol and droplet transmission which is particularly a cause of concern for the dental care provider as they work in close proximity with the patient using droplet and aerosol generating procedures. The fact that the droplet spread mainly occurs within a 3' radius of the infective focus should be a reason of concern for the dentists.<sup>10</sup>

With no established etiology, mode of transmission and treatment, prevention seems to be the only weapon. Person-to-person transmission in close family as well as in healthcare settings has occurred in the past, and WHO has issued recommendations for infection control measures for handling cases of MERS.<sup>11</sup> Prescreening is a vital facet that can go a long way in identifying and curbing the disease in the initial stages and has been proven to be instrumental in curtailing similar diseases like SARS.<sup>12</sup> According to WHO, it should include screening of fever, respiratory symptoms and a significant contact history in the presence of a chest radiograph. Comorbid chronic illness should be grouped as those with possible impact on respiratory function (pre-existing ischemic heart disease/congestive cardiac failure, chronic obstructive pulmonary disease) and those that could suppress the immune status (diabetes mellitus, chronic renal failure, malignancies, chronic immunosuppressive therapies).<sup>13</sup> The importance of case history, especially medical history, cannot be emphasized more. If any patient's history suggests of the symptoms with or without the history of travel to affected regions, it is advisable to postpone the treatment for 15 days unless it's an emergency.

As per the guidelines of centers for Disease Control and Prevention (CDC), dental personnel should be taught or given refreshers on infection control practices to safeguard against nosocomial transmission. Personal protective equipment (PPE) should be worn at all times of treatment; even use of a respirator instead of mask is suggested. Maintenance of hand hygiene frequently, including before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE should be made mandatory.

Another important aspect of infection control includes the maintenance of infection free contact surfaces and equipments by standard procedures.<sup>14</sup> Other significant areas involve avoidance of aerosol generation by minimal or no use of ultrasonic

scalers, rotary handpieces, three in one syringes and lasers. Use of rubber dam isolation and preprocedural mouthwash rinse has shown marked decrease in the droplet transmitted infections.

With such globally threatening disease, it's about time to ascertain guidelines to redesign dental clinics based on aerobiological engineering principles. Employing air filters like high efficiency particulate air filters, high volume evacuation and extraoral evacuation devices can be effectively used in controlling generated aerosols.<sup>10</sup> Optimized combinations of filtration and ultraviolet germicidal irradiation can be used to remove airborne microbes with high efficiencies. A variety of other technologies, like photo catalytic oxidation, ozone, pulsed light and antimicrobial materials, are also available for air and surface bio contamination problems. Old clinics retrofitted with air disinfection systems and aerobiological cleanliness by design can be incorporated in upcoming dental setups.

In conclusion, MERS-CoV is a potential pathogen with pandemic proportion and with high risk of mortality. It has demonstrated a real potential for nosocomial transmission, and stringent recommendations have to be implemented around possible cases as soon as MERS-CoV infection is suspected. The challenge presented by atypical symptoms highlights the need for a better knowledge about both the virus and the disease. The emergence of such potential airborne disease calls for a collective responsibility by the dental fraternity to develop and practice new disinfection measures to curtail the disease in its bud.

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