

Transforming Dental Care for Geriatric Patients Beyond Covid

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ABSTRACT

Due to a decrease in immunity and the presence of comorbid conditions, the geriatric population is more vulnerable to COVID-19 infection. The aim of this article is to review the need for transformation in the approach to delivering dental care to geriatric patients considering the prevalent COVID-19 infection and the probability of more such outbreaks in the future.

Several micronutrients have emerged as being essential in protecting against the severity of COVID-related morbidities like Vitamin D, K, A, and C, zinc, and selenium. Chances of interaction between dentists and elderlies are higher. So, dietary counselling can be provided and the need for customised dietary plans can be evaluated during these interactions. Ministry of health and family welfare India, the Dental Council of India, and the Indian Dental Association provided advisories for dental professionals to contain the spread of infection. Teledentistry and digital dentistry have emerged as essential tools in this pandemic to prevent the spread of infection. During the second wave, mucormycosis cases have raised in patients with debilitating diseases. The role of a prosthodontist in such cases is very important not only in the fabrication of a surgical obturator but also to rehabilitate normal speech, mastication, and esthetics. Shifting paradigm to focus on reducing the number of appointments, conducting non-aerosolising procedures, and prevention-based approaches should be prioritised to reduce the burden of people in the dental clinic.

Keywords: COVID-19, Dental Care, Geriatric Dentistry, Mucormycosis.

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Crossref Doi: <https://doi.org/10.36437/irmhs.2022.5.2.A>

Introduction

Aging is a natural process. Old age should be regarded as a normal, inevitable biological phenomenon.¹ In the elderly, immunosenescence and comorbid conditions are more likely to promote viral-induced cytokine storms resulting in life-threatening respiratory failure and multisystemic involvement.² Older age (60 y or above) is considered the major risk factor for COVID-19 (Coronavirus disease-19).³ Aging individuals with systemic disorders such as hypertension, diabetes mellitus, cardiovascular

diseases, social deprivation, and ethnicity are associated with more severe symptoms of COVID-19.^{4,5,6} With the increase in age, there is a decrease in immunity, T-cell alterations, and chronic activation of the innate immune system.⁷ All these characteristics of old age reduce the ability of elderlies to fight SARS-CoV-2 virus 9 (severe acute respiratory syndrome coronavirus 2) initiated cytokine storms, then cause disseminated intravascular coagulation and multi-organ failure.⁷ In Europe, at the starting of the pandemic, 45% of infected people were aged 60 or more and most of

the deaths occurred in the same age group whereas in Italy mean age of patients who died due to covid-19 was 79.5 years and had comorbidities.^{8,9} COVID-19 is generally transmitted through contact of mucous membranes (eyes, nose, or mouth) with infectious respiratory droplets or fomites. Transmission risks increase by coming in contact with the infected persons or infected surroundings.¹⁰ The New York Times reported that dental health care workers are among the highest risk of COVID-19, as patients' mouths remain open and unmasked during treatment.^{11,12} Since the onset of the pandemic advisories from different professional regulatory bodies have refrained from providing any non-emergency dental care to symptomatic patients and to waiting until the patient has recovered from the disease.¹³ Ministry of health and family welfare India provided advisory for dental professionals to contain the spread of infection.¹⁴

Since the elderly population is more prone to edentulism and are often found wearing dentures¹⁵, it is expected that the frequency of elderly patients visiting dental clinics is greater due to their pre-existing oral conditions. Prevalence of edentulism (2007-2008) was reported at 11.7% among 50 years and older adults in six middle-income countries like India, Mexico, and Russia.¹⁶ A study conducted by Peltola et al found that elderly patients had poor hygiene with regard to the removable prosthesis and oral cavity, and most of them required restorative dental treatment.¹⁷ The rate of edentulism for Asians was 14.22% in 2008.¹⁸ Therefore, the population which is at an increased risk of getting COVID-19 infection is also the one with the increased need for oral rehabilitative procedures.

During the outbreak of the second wave, the Dental council of India issued an advisory regarding the posting of dental postgraduates in medical colleges and hospitals for pre-screening, recording case history and identification of vulnerable age groups, community engagement, contact tracing, and patient tracking, and health facility infection control management. Due to a decrease in the dental task force during this period, all the dental procedures were hampered

in dental colleges and hospitals and patients were not able to visit or contact dental professionals. This further deteriorated their oral health.¹⁹ The aim of this article is to review the need for transformation in the approach to delivering dental care to geriatric patients considering the prevalent COVID-19 infection and the probability of more such outbreaks in the future.

Impact of Oro dental Health and Nutrition on Susceptibility to Covid Infections

Oral health is considered an integral part of general health and overall well-being.²⁰ Aging is associated with several physiological changes which may lead to progressive dehydration of mucosa, reduce in the sensation of taste and smell, and lower saliva quantity and quality that leads to inadequate food intake and nutritional deficiency.^{21,22,23} Loss of taste and smell has been repeatedly reported as a few of the classic symptoms of COVID 19. A study conducted by Kandakure et al found that with the intake of antibiotics, anti-allergic, multivitamin and multimineral, tablet zinc, steam inhalation, and nasal saline drops, most of the patients recovered completely from anosmia and ageusia in 14-21 days.²⁴

According to studies, one in five older people reported that an oral condition prevented them from eating the foods they would choose. It has been reported that people with less than 20 teeth or wearing complete dentures had lower nutritional intakes than people with more than 20 teeth.²⁵ Amagai et al found that brief dietary advice provided by dentists can improve the food intake of edentulous elderly.²⁶ Chances of interaction between dentists and elderlies are higher. So, dietary counselling can be provided, and the need for customised dietary plans can be evaluated during these interactions.

Several micronutrients have emerged as being essential in protecting against the severity of COVID-related morbidities.

Vitamin D has antioxidant and anti-inflammatory properties. Annweiler et al in their study concluded that Vitamin D3 intake in the old age population resulted in less severe symptoms of

COVID and better survival rates. Clinical supervision and dietary counselling to maintain the circulating 25, (OH)D in the optimal levels of 75-125 nmol/L are mandated.²⁷

Various studies have found that there was a decrease in concentrations of Vitamin K in patients suffering from COVID-19 due to dysregulation of the coagulation cascade and an increase in levels of circulatory cytokines along with lung fibrosis and various comorbidities. Old age population suffering from thromboembolic diseases take Vitamin K antagonists which decreases the bioavailability of active Vitamin K which may eventually cause possible life-threatening complications in COVID-19.²⁸

Vitamin A or “the anti-infective vitamin” inhibit proinflammatory processes, and can provide immunomodulatory and anti-oxidant effects in SARS-CoV-2. To prevent viral infection in elderly people 2,000–4,000 IU Vitamin A per day supplementation is recommended.²⁹

In high concentrations Vitamin C has complex immunomodulatory, antiviral, antibacterial, antioxidative, and anti-inflammatory properties and suppress cytokine storms, one of the main mechanisms in the deterioration of patients with COVID-19. 1000-3000mg Vitamin C is recommended orally to prevent COVID-19.³⁰

Selenium prevents viral infection by decreasing reactive oxygen species burden and to prevent infection, elderly should take 100–200 µg selenium per day.³⁰

Zinc deficiency is a commonly found deficient element in the geriatric population. It has complex immunomodulatory, antioxidant, anti-inflammatory, and antiviral activities and reduces the risk, duration, and severity of SARS-CoV-2 infections in the elderly.³⁰ Nutritional deficiency of zinc in the elderly can alter taste sensation^{28,30} and can mask the early detection of clinical COVID symptoms. Recommended daily dose of zinc is 10-20 mg.³⁰ Zinc intake improves taste sensation in the elderly.³¹

Dental Considerations during Covid-19 Era

Before starting dental treatment “The Five-Point Geriatric Dental Assessment”: OSCAR (Oral, Systemic, Capability, Autonomy, Reality) must be done to guide the practitioner in planning and management. It includes taking detailed oral and systemic history to evaluate risk versus benefit, the capability of old-aged patients to take good care of themselves and to consent to care, and finally elderly patient's ability to face the reality of life like life expectancy.^{32,33}

Pandemic has created a need to review the means of providing uninterrupted care to the elderly population who are either in the need of new prostheses or restoration and maintenance of oral cavity to avoid any impediment of oral function thereby causing reduced nutritional intake.

A new prosthesis should be fabricated if the current prosthesis is affecting the systemic health of the patient. Primary impressions are advised to be made in well-fitting stock trays followed by single-step border moulding to minimize chair side time. There should be minimum processing errors in the lab, and dentures should be remounted to adjust occlusion. This will ensure lesser follow-up visits to the patient. For fixed prosthodontics rubber dam, high vacuum evacuation and anti-retraction handpieces are recommended to decrease the viral load.³⁴ Evaluate the possibility of placing an immediate implant followed by temporisation after removal of the tooth on the same day.³⁵

It is recommended to repair the fracture components otherwise, the use of prosthesis is suspended if extensive work is required during this pandemic outbreak of COVID-19 to avoid any further emergency.³⁶ Disinfect the impression trays, materials, casts, and temporary dentures appropriately and mention the COVID status of the patient before sending them to the laboratory.³⁷

A need to increase oral hygiene maintenance and frequency of prosthesis cleaning during the pandemic has enhanced and improved OHRQoL during this period.³⁷

Various dental emergencies cannot be neglected. They need immediate attention and management like unstable maxillomandibular fractures, uncontrolled bleeding, severe uncontrolled pain, cellulitis or a diffuse soft tissue bacterial swelling, infection with intra oral or extra oral swelling that potentially compromises the airway, trauma involving the face or the facial bones, severe trismus, persistent non-healing ulcers.¹⁷

Before entering in dental operatory, every patient should be screened for COVID to minimize exposure to staff and other patients. Waiting areas should include visual alerts to motivate the patients for COVID-appropriate behaviour. Disinfection protocol should be followed adequately and efficiently with freshly prepared 1% sodium hypochlorite for ten minutes.¹⁴ Use of aerosol-generating procedures, handpieces, air-water syringes, and ultrasonic scalers are advised to be avoided or minimized and the use of hand instruments is encouraged. Extending the operational working hours to reduce the number of patients visit was also suggested.³⁸ Extraoral imaging is encouraged to prevent infection.³⁹ Endodontic treatment to be done under rubber dam isolation and traumatic restorative treatment is preferred.⁴⁰

Role of Teledentistry and Digital Dentistry for the Management of Dental Problems In Geriatric Patients

Telehealth has emerged as a great tool in this pandemic that enables everyone to stay at their home while maintaining communication with their dentist through a virtual channel.⁴¹ It is essential to use a teledentistry model prior to planning an appointment with geriatric patients with the help of which unnecessary appointments can be avoided.⁴² It can also be used for dental hygiene education and emergency advice.⁴¹ Teledentistry can be used for education, consultation, and triage, allowing providers to advise patients whether their dental concerns constitute a need for urgent or emergency care, whether a condition could be temporarily alleviated at home, or whether treatment could be postponed. It can help lessen the burden of

people seeking dental care in overwhelmed emergency departments and urgent dental care settings.⁴⁰

Even after following all the precautionary measures, the conventional prosthetic workflow contains various steps wherein cross infection and contamination may occur as the oral fluids (saliva and blood) comes in direct contact with impressions.⁴³ In this regard use of the digital impression technique with digital scanners is useful and has enormous future scope. In digital impressions, the scanner tip is inserted into the patient's mouth and disinfected with the help of alcohol-based disinfectants.⁴¹ Digital dentistry is efficient and reduces chairside time with improved patient satisfaction.⁴¹ Digital spectrophotometry can be used for shade selection for better outcomes and preventing infection.³⁶ It is advised to perform preprocedural mouth rinses to reduce the viral load and cross-infection.⁴¹ with hydrogen peroxide 1%, povidone, or cetylpyridinium chloride (CPC) 0.10% to 0.05%.^{24,44}

Post Covid Black Fungus Related Orofacial Morbidity-Challenge for Prostodontist

Mucormycosis Zygomycosis or Phycomycosis is an uncommon yet life-threatening infection prevailing in India in patients post COVID-19 infection.⁴⁵ The estimated prevalence of mucormycosis in India is nearly 70 times higher than the global data due to the abundant presence of Mucorales in the community and hospital environment.^{46,47} The mean annual incidence of mucormycosis in India was 9.5 with a male to female ratio of 2.8:1 and 97.4% in adults.⁴⁴ India reported a significant rise in COVID-19 cases with more rapidly increasing black fungus cases during the second wave.^{48,49}

India is the second-largest diabetic population globally (65.1 million).⁵⁰ Diabetes mellitus, haematological malignancy, solid-organ transplantation, immunocompetent host, chronic kidney disease, steroid therapy, pulmonary tuberculosis, and chronic obstructive pulmonary

disease are some of the risk factors associated with mucormycosis in COVID-19.⁴⁴ A study conducted by Rao et al found that middle-aged COVID-19 patients with diabetes mellitus who received steroids and zinc as a self-medication practice were found to be more prone to mucormycosis.^{43,47,51,52} Improper use of corticosteroids (i.e. dexamethasone, hydrocortisone, or prednisone) in Covid-19

patients is the primary reason for an increase in black fungus infection.⁵³

Rhino-orbito-cerebral mucormycosis is the most common form affecting the head and neck, orbit, facial bones, and cranial cavity.⁴⁸ The patient presents with loose teeth, gingival abscess, and facial pain in Oral and Maxillofacial surgery.⁴⁸ In bone marrow it damages the endothelial lining of vessels, leading to bone necrosis and fungal osteomyelitis.⁴⁸ (Figure 1: a and b)



Figure: A



Figure: B

Figure I: Intraoral findings in Post-COVID mucormycosis patient; a) Multiple pus draining

sinuses on the buccal aspect of the maxillary ridge, b) 4×2 cm swelling present on midline of

hard palate; (Patient presented with a chief complaint of loosening and pain in upper front teeth. There was a positive history of COVID infection and intake of steroids. Hba1c report showed a 7.2mg/L blood glucose level).

When natural teeth are lost, alveolar bone resorption takes place and results in reduced soft tissue support.⁵⁴ OHR-QoL is adversely affected due to impairment of taste and smell with functional disabilities and compromised esthetics.⁵⁵

Aggressive surgical debridement is commonly instituted, which results in the loss of the palate, maxilla, and contiguous structures, followed by difficulties with speech, deglutition, mastication, and respiration.⁵⁴

The role of a prosthodontist in such cases is very important not only in the fabrication of a surgical obturator but also to rehabilitate normal speech, mastication, and esthetics.⁴⁶ Remote implant-bone anchorage (pterygoid, zygomatic, and nazalus implants), which can be retention for prosthesis are advisable.⁵⁶

Future Plan of Action – Testing For Covid-19 to Increase Safe Patient Flow in Dental Clinics

With the emergence of new variants of coronavirus the possibility of a new wave of COVID infection remains. In order to provide uninterrupted dental care to elderly patients, without increasing the risk of transmission, it is necessary to screen those who are visiting dental clinics and are asymptomatic and without known or suspected exposure.⁵⁶ Such point-of-care detection of COVID-19 infection needs to have a minimum infrastructural requirement, short turnaround time, high throughput, and accuracy with low cost.⁵⁶ ICMR has recommended the use of Standard Q COVID-19 Ag detection assay as a point of care diagnostic assay for testing in dental settings where asymptomatic patients undergo aerosol-generating surgical/non-surgical interventions.⁵⁷ Such tests are recommended in

combination with the gold standard RT-PCR test.⁵⁷

Conclusion

To date, there is no such data that shows the difference in COVID-related morbidity among the elderly population with different oral conditions like periodontitis, gingivitis, etc. As time will progress, more studies will give a better understanding of the prediction of morbidity and mortality including poor oral health. Shifting paradigm to focus on reducing the number of appointments, conducting non-aerosolising procedures and prevention-based approaches should be prioritised to reduce the burden of people in the dental clinic.

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How to cite this Article: Priyanka Singh Raghav, Abirami S, Sabzar Abdullah, Geeta Rajput, Shaista Afroz; Transforming Dental Care for Geriatric Patients Beyond Covid; Int. Res. Med. Health Sci., 2022; (5-2): 1-11; doi: <https://doi.org/10.36437/irmhs.2022.5.2.A>

Source of Support: Nil, **Conflict of Interest:** None declared.

Received: 22-2-2022; **Revision:** 19-4-2022; **Accepted:** 24-4-2022