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World J Methodol 2022 September 20; 12(5): 331-464



REVIEW

- 331** Hemostatic system and COVID-19 crosstalk: A review of the available evidence
Wafi MN, Morad MA, El Sheemy R, Abdeen N, Afify S, Abdalgaber M, Abdellatef A, Zaghloul M, Alborae M, El-Kassas M
- 350** Syndemic aspects between COVID-19 pandemic and social inequalities
Apolonio JS, da Silva Júnior RT, Cuzzuol BR, Araújo GRL, Marques HS, Barcelos IS, Santos LKS, Malheiro LH, Lima de Souza Gonçalves V, Freire de Melo F

MINIREVIEWS

- 365** COVID-19 neuropsychiatric repercussions: Current evidence on the subject
da Silva Júnior RT, Santos Apolonio J, Cuzzuol BR, da Costa BT, Silva CS, Araújo GRL, Silva Luz M, Marques HS, Santos LKS, Pinheiro SLR, Lima de Souza Gonçalves V, Calmon MS, Freire de Melo F
- 381** Diagnosis and management of small bowel neuroendocrine tumors: A state-of-the-art
González-Yovera JG, Roseboom PJ, Concepción-Zavaleta M, Gutiérrez-Córdova I, Plasencia-Dueñas E, Quispe-Flores M, Ramos-Yataco A, Alcalde-Loyola C, Massucco-Revoredo F, Paz-Ibarra J, Concepción-Urteaga L
- 392** Pandemic control - do's and don'ts from a control theory perspective
Tomov L, Miteva D, Sekulovski M, Batselova H, Velikova T
- 402** Non-medicalization of medical science: Rationalization for future
Mittal M, Jethwani P, Naik D, Garg MK

ORIGINAL ARTICLE

Observational Study

- 414** Migraine in physicians and final year medical students: A cross-sectional insight into prevalence, self-awareness, and knowledge from Pakistan
Choudry H, Ata F, Naveed Alam MN, Ruqaiya R, Suheb MK, Ikram MQ, Choudhry MM, Muaz M

SYSTEMATIC REVIEWS

- 428** Role of the circulatory interleukin-6 in the pathogenesis of gliomas: A systematic review
Singh M, Raghav A, Gautam KA
- 438** Growth differentiation factor 15 as an emerging novel biomarker in SARS-CoV-2 infection
Parchwani D, Dholariya S, Katoch C, Singh R

META-ANALYSIS

- 448** Microvessel density in differentiated thyroid carcinoma: A systematic review and meta-analysis
Perivoliotis K, Samara AA, Koutoukoglou P, Ntellas P, Dadouli K, Sotiriou S, Ioannou M, Tepetes K

LETTER TO THE EDITOR

- 459** Radiological evaluation of patellofemoral instability and possible causes of assessment errors: Letter to the editor
Mesregah MK
- 461** Mouth shield to minimize airborne transmission risk of COVID-19 and other infectious diseases in the dental office
Dimashkieh MR, Nassani MZ, Talic YF, Alqerban A, Demachkia AM

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Mouth shield to minimize airborne transmission risk of COVID-19 and other infectious diseases in the dental office

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Abstract

Transmission of coronavirus disease (COVID-19) and other infectious diseases is a significant risk during dental procedures because most dental interventions involve aerosols or droplets that could contaminate the surrounding environment. Current protection guidelines to address the high risk of droplets, aerosols, and airborne particle transmission of COVID-19 in the dental office recommend minimizing aerosol-generating procedures. In this paper, an innovative mouth shield is presented that should minimize water backsplash from the air-water syringe during dental treatment. The mouth shield can be added to the personal protective equipment to provide the dental team with extra protection. It can be made of different materials, is straightforward, inexpensive, and safe to fabricate, and is easy to use.

Key Words: Mouth shield; Transmission; Dentistry; COVID-19; Airborne; Droplets; Aerosols; Infectious diseases

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Core Tip: This letter to the editor presents an innovative mouth shield to increase the protection of the dental team against the water backslash of aerosols, droplets, and airborne particles during dental procedures.

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TO THE EDITOR

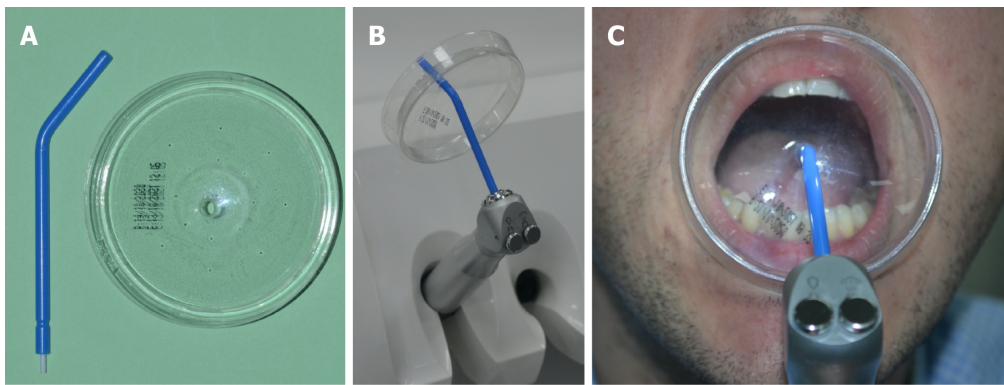
The coronavirus disease (COVID-19) pandemic has spread fear and anxiety across the globe because of its high death toll[1]. Various strategies have been introduced to combat the transmission of COVID-19 and reduce its severity, including the expedited development and approval of vaccines[2]. The risk of transmission of COVID-19 in the dental office has led to specific treatment guidelines and protocols, including the minimal use of aerosol- or droplet-generating procedures[3-6]. However, most dental interventions produce aerosols and droplets, contaminating the surrounding environment and leaving dental personnel at risk of acquiring COVID-19 from infected patients. Although non-emergency dental services were halted at the outset of the pandemic, the long duration of the pandemic has required dental practices to resume their services, but with additional precautions and careful triage of patients [7]. Strict adherence to preventive and protective measures became the mantra for oral care services to maintain an active dental practice at the era of COVID-19[8,9]. The aim of this paper is to introduce an innovative, straightforward, and inexpensive personal protection device that minimizes water backslash from air-water syringes during cavity washing and drying. The goal was to develop a special mouth shield that should minimize the transmission risk of COVID-19 and other infectious diseases *via* airborne droplets or aerosols in the dental office.

MOUTH SHIELD

The mouth shield attaches to the air-water syringe tip and consists of a transparent shield made from the plastic lid of a conventional, disposable, crystal clear plastic cup. The center of the lid is perforated with a 3.5-mm-diameter twist drill to produce a frictional fit with the tip of an air-water syringe and form a disposable mouth shield (Figures 1A and B). The mouth shield can be positioned to maintain light contact with the patient's lips (Figure 1C). It can be used with most air-water syringes during various dental procedures. Different size lids made from disposable, crystal clear polyethylene terephthalate plastic or polystyrene can be selected to accommodate patients with varying degrees of mouth opening. The front surface of the shield can be relined with a water absorbent liner to capture scattered droplets. The mouth shield can also be easily adjusted forward and backward along the tip (nozzle) of the air-water syringe for convenience (video).

DISCUSSION

The COVID-19 pandemic and the increased risk of infection prompted the authors to develop a cost-effective disposable mouth shield to provide protection against back splashes of aerosols, droplets, and airborne particles during dental treatment. An air-water syringe is essential for dental procedures such as etching, bonding, cavity cleansing, and impression making. Contamination from the aerosol could be a major source of infection[10]. The association between aerosols, droplets, and splatter and the transmission of COVID-19 has been emphasized, and recommendations have been made to reduce their generation during the coronavirus pandemic[4,11-13]. Furthermore, emphasis has been placed on the role of personal protective equipment such as medical masks, protective face shields, and goggles in preventing and minimizing airborne transmission of COVID-19[14,15]. Despite the use of personal protective equipment, transmission of the viral infection is still possible, and additional preventive precautions are advised. For example, while wearing magnifying loops, it is not feasible to wear a face shield, leaving the face of the operator exposed to contamination. The described mouth shield provides additional protection at minimal cost. It is designed to prevent water backslash out of the oral cavity during mouth/tooth washing and drying, minimizing contamination of the surrounding environment and dental personnel. Being transparent, the shield will allow light to reach the field of operation and



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Figure 1 Crystal clear plastic cup lid mouth shield. A: Traditional, disposable, crystal clear plastic cup lid perforated in the center using a 3.5-mm-diameter twist drill and a disposable air-water syringe tip; B: The air water syringe tip is inserted with a friction fit through the central hole of the plastic cover to form a mouth shield; C: The mouth shield rests lightly on the patient's lips, sealing the mouth during water/air spray.

allow the operator to easily see into the patient's mouth. The described mouth shield has been successfully implemented and evaluated in our dental practice. Nevertheless, the effectiveness of the mouth shield in minimizing the airborne aerosols and droplets spread during dental treatment should be investigated, and its role in protecting against infectious diseases, with a comparison of the load of produced aerosols, droplets and airborne particles with and without this shield, should be examined before this shield can be adopted for global use.

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FOOTNOTES

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