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Building infrastructure and operating-technological options in post-COVID-19 oral health care

Infraestrutura predial e possibilidades operatórias-tecnológicas na atenção à saúde bucal pós-COVID-19

Infraestructura de edificio y opciones tecnológicas operativas en la salud bucal post-COVID-19

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Abstract

During the COVID-19 pandemic, concerns about the impact of the aerosol generated in dental procedures on the spread of disease led to additional infection control measures that will remain as part of the biosafety routine after the end of the pandemic. This article addresses a little discussed topic that concerns the need to adapt the physical space and operational-technological choices for post-COVID dental care19. The current architecture of spaces for dental care in teaching and public health service units allows the care of several patients simultaneously. However, aerosols are produced routinely during dental procedures, with a real possibility of

contamination between different patients. In this way, we present perspectives and suggestions for readjusting these spaces for teaching units and public health services in the short, medium and long term and also for using the resources of Information and Communication Technologies and minimally invasive dentistry.

Keywords: Containment of biohazards; Facility design and construction; Evidence-based facility design; Community dentistry; Dentistry.

Resumo

Durante a pandemia de COVID-19, as preocupações sobre o impacto do aerossol gerado em procedimentos odontológicos na disseminação da doença levaram a medidas adicionais de controle de infecção que permanecerão como parte da rotina de biossegurança após o fim da pandemia. Este artigo aborda um tema pouco discutido que diz respeito à necessidade de adequação do espaço físico e das escolhas tecnológico-operacionais para a assistência odontológica pós-COVID19. A arquitetura atual de espaços de atendimento odontológico em unidades de ensino e serviços públicos de saúde permite o atendimento de vários pacientes simultaneamente. Porém, aerossóis são produzidos rotineiramente durante procedimentos odontológicos, com possibilidade real de contaminação entre diferentes pacientes. Dessa forma, apresentamos perspectivas e sugestões para a readequação desses espaços para unidades de ensino e serviços públicos de saúde no curto, médio e longo prazo e também para a utilização dos recursos das Tecnologias da Informação e Comunicação e da odontologia minimamente invasiva.

Palavras-chave: Contenção de riscos biológicos; Arquitetura de instituições de saúde; Projeto arquitetônico baseado em evidências; Odontologia comunitária; Odontologia.

Resumen

Durante la pandemia de COVID-19, las preocupaciones sobre el impacto del aerosol generado en los procedimientos dentales en la propagación de la enfermedad llevaron a medidas adicionales de control de infecciones que permanecerán como parte de la rutina de bioseguridad después del final de la pandemia. Este artículo aborda un tema poco discutido que se refiere a la necesidad de adaptar el espacio físico y las opciones operativas-tecnológicas para el cuidado dental post-COVID19. La arquitectura actual de espacios para la atención odontológica en las unidades docentes y del servicio de salud pública permite la atención de varios pacientes simultáneamente. Sin embargo, los aerosoles se producen de forma rutinaria durante los procedimientos dentales, con una posibilidad real de contaminación entre diferentes pacientes.

De esta manera, presentamos perspectivas y sugerencias para reajustar estos espacios de unidades docentes y servicios de salud pública a corto, mediano y largo plazo y también para el uso de los recursos de las Tecnologías de la Información y la Comunicación y la odontología mínimamente invasiva.

Palabras clave: Contención de riesgos biológicos; Arquitectura y construcción de instituciones de salud; Diseño de instalaciones basado en evidencias; Odontología comunitaria; Odontología.

1. Introduction

The SARS-CoV-2 pandemic outlined important challenges for dental practice. The transmission of the virus through direct contact with infected people and inhalation of contaminated droplets or aerosols has been well established (Guo et al., 2020), placing oral health professionals among the most exposed because they work directly with the oral cavity, dealing with saliva, blood and aerosols during most of the periods clinical procedures (Carrer, Galante, et al., 2020; Meng et al., 2020).

In the absence of population immunity to the new virus, precautions such as social detachment and isolation were established to mitigate the speed of contamination of the disease, avoid overloading health systems and, consequently, reduce the number of deaths (Lau et al., 2020). Among these measures, several countries directed the suspension of elective dental treatment until the pandemic was contained. In addition, protocols were developed with guidance on infection control measures in times of COVID-19, in order to reduce the risk of contamination by professionals and patients (Carrer, Galante, et al., 2020; Volgenant et al., 2020).

Such protocols provided guidance on the use of personal protective equipment, indication of pre-service mouthwashes for patients, cleaning and disinfecting surfaces and sterilizing instruments. However, there is an issue little debated and that refers to engineering projects for the organization of dental care in public health services and teaching units. It is expected that, as science evolves in relation to the prevention, treatment and control of COVID-19, dental care will be normalized. However, additional infection control measures should remain part of the biosafety routine.

Nevertheless, it must be considered that we will continue to observe the emergence of new viruses and infections (Scully & Samaranayake, 2016) and concerns about the impact of the aerosol generated in dental procedures on the spread of diseases will remain until scientific evidence emerges and becomes widely known. In this context, the present article in perspective

intends to address the need to adapt the physical space and operational-technological choices for post-COVID-19 dental care.

2. Methology

Narrative review design. We searched scientific evidence and summarized the findings in two separate objectives: (1) current scenario; (2) adequacy of environments in the short, medium and long term.

3. Current Scenario

To understand the complexity of the subject, we need to assess the current situation and review the scientific evidence available. The guidelines for controlling cross-infection during dental care seek ideal and economically viable precautions, rather than maximum precautions (Volgenant et al., 2020). Thus, the architecture of spaces for dental care in teaching and public health service units allows the care of several patients simultaneously. Reasons for such an organization are legitimate and include the need for direct supervision of students and interns by teachers and the optimization of material and human resources and physical space in public health units, especially in Primary Health Care (PHC).

However, aerosols are produced routinely during dental procedures. These contain microorganisms originating from the patient's oral cavity and the equipment's water pipe and can be an important means of transmitting infections (Zemouri et al., 2020). The release of microorganisms in aerosols increases the microbial load in the air and can lead to contamination of the surfaces in the service room (Zemouri et al., 2017). A 2020 study showed a high level of aerosol contamination in an 80 cm radius around the patient's head (Zemouri et al., 2020). However, the authors warned that only the bacterial spread was determined and the viruses are much smaller and can therefore reach much greater distances (Zemouri et al., 2020).

Research carried out in the midst of the pandemic has shown that SARS-CoV-2 can remain viable and infectious in aerosols for three hours (Van Doremalen et al., 2020). Unlike cough or sneeze droplets that fall to the ground quickly, aerosols form a vaporized and contaminated cloud (Van Doremalen et al., 2020), with a real possibility of contamination among patients treated simultaneously. A common situation in teaching units and public health services, which implies the need to review what would be the ideal precautions for controlling cross-infection in dental environments.

It is emphasized that the approach of this article is limited to discussing the possibility of contagion among patients treated simultaneously in environments that do not have individualized offices. The protocols made so far provide for the need to contain aerosols, but do not address this context.

4. Adequacy of Environments in the Short, Medium and Long Term

The new recommendations have already included an additional cost for clinical dental care. Therefore, considering the economic viability and the scarce resources destined to oral health, it is expected that the adaptation of physical environments will be gradual, with measures of initial care and planning for future changes, coupled with the development of specific research.

As mentioned earlier, there are legitimate reasons for allocating multiple offices in teaching units and public services. In the case of teaching, the possibility of organizing in individual offices is not envisaged at any time, since the direct supervision of the teacher is essential in the learning phase. However, partial partitions no longer represent a good alternative to the vaporized and contaminated cloud formed during aerosol-generating procedures. In this scenario, a plausible possibility may be the use of solid partitions manufactured with transparent and monolithic material, in order to allow both direct supervision and to facilitate the execution of disinfection procedures. At this point, there is a need for scientific investigation regarding the most suitable material for manufacturing the partitions. And studies must consider, in addition to safety issues, costs, durability and maintenance.

Still in the teaching environment, it is possible to consider reducing the number of students per practical class in order to increase the distance between them without needing to modify the building infrastructures immediately. Such a measure could be carried out by increasing the number of practical classes in the academic semesters, which would necessarily imply the need to increase the number of teachers; or by reducing the number of tickets to Dentistry courses until evidence about the safe distance between two offices is available and adjustments can be made. Institutions should evaluate the alternatives and consider the best option to ensure the safety of the patients who are served there. Class organizations must have space to build dialogue, ensuring a democratic decision. In the medium and long term, teaching units must prepare and readjust their initial biosafety / building plans and preventive and corrective building maintenance plans, with the need for them to be based on the results of

scientific studies.

The use of the suggested partitions may also be a short-term measure in the case of public service, but there are other possibilities. For example, the use of Information and Communication Technologies (ICT) resources has the potential to enable health care in accordance with the principles of universal access, equity in actions and comprehensive care (Carrer, Matuck, et al., 2020). However, among ICTs, the Federal Council of Dentistry (CFO) allowed in a recent ordinance only the exercise of telemonitoring and teleorientation activities (Carrer, Matuck, et al., 2020; CFO, 2020).

The use of teleodontology, which is not permitted in the CFO ordinance, has the potential to strengthen PHC and expand health care, preventing the accumulation of treatment needs that can lead to an important financial and social impact for health services and their users (Carrer, Matuck, et al., 2020; CFO, 2020). It is necessary to consider, therefore, that the current historical moment requires the revision of the ordinance with the inclusion of procedures such as consultation and prescription, to increase the possibilities of performance of professionals from the Unified Health System (SUS) (Carrer, Matuck, et al., 2020).

However, considering the still high demand for curative care, the risks of contamination and the potential release of microorganisms in aerosols generated during dental care (Kassebaum et al., 2017; Zemouri et al., 2017), it is also necessary to think about short and medium term measures to rationalize the use aerosol-generating procedures, in order to guarantee safe in-person treatment for patients. Within this context, minimally invasive procedures need to be reinforced and privileged in dental practice to the detriment of conventional curative techniques.

Minimally invasive dentistry adopts a philosophy that integrates health promotion, prevention and minimally invasive clinical procedures (Dawson & Makinson, 1992). However, there are obstacles that hinder its full implementation in clinical practice, including lack of knowledge and adequate training in the use of these procedures (Jingarwar et al., 2014; Newton & Asimakopoulou, 2017). Within this approach, improving the behavior related to patients' oral health is a critical component of preventive conduct, essential for the practice of minimally invasive dentistry (Newton & Asimakopoulou, 2017)19, a fact that reinforces the importance of ICT for the promotion and prevention of oral health in the current and future scenario .

Despite this, it is recognized that, in some procedures, the operation with the generation of aerosols is inevitable. Thus, it is imperative to regulate and build individual dental offices, even if in a long-term perspective, to ensure care for patients' safe integral oral health. Such changes necessarily imply greater investments in the area of oral health, especially in the

context of the NHS and the Smiling Brazil, which have been dismantled and precarious, a reduction of allocation of resources and inactivation of care units to oral health, as the case the specialized dental clinics.

That said, we reiterate the importance of research on the risk of contamination during dental care. To guarantee security professionals and patients, all possible scenarios should be considered and not only the individualized care, particularly in private clinics. Specific evidence for the field of dentistry tend to be smaller. This becomes critical because, for baseline issues such as safety masks, were no clinical studies on its effectiveness in dental practice in relation to virus protection, which forces the class to work with evidence extrapolated from other realidades4 in risk exacerbated imposed by the creation of aerosols.

5. Final Considerations

Faced with a new infectious disease, for which humanity has no immunity and health professionals still lack the necessary scientific evidence, it is expected that infection control protocols in dental care are reviewed and updated. This article drew attention to the need to readjust both the building infrastructure of dental offices in teaching units and public health services, as well as the choice of minimally invasive surgical procedures, when indicated.

It is necessary for researchers to design studies to safely point out the necessary protective measures and their cost-effectiveness, especially considering the possibility of viral reemergence. So catch sight the ability to anticipate scenarios and plan the most appropriate actions cross infection control in dental environments.

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