doi.org/10.51891/rease.v12i11.32909

TRANSIÇÕES NA PRÁTICA ODONTOLÓGICA DURANTE A PANDEMIA DE COVID-19: EVIDÊNCIAS DO SISTEMA DE SAÚDE PÚBLICA EM MANAUS, AMAZONAS, BRASIL

DENTAL PRACTICE TRANSITIONS DURING THE COVID-19 PANDEMIC: EVIDENCE FROM THE PUBLIC HEALTH SYSTEM IN MANAUS, AMAZONAS, BRAZIL

TRANSICIONES EN LA PRÁCTICA ODONTOLÓGICA DURANTE LA PANDEMIA DE COVID-19: EVIDENCIAS DEL SISTEMA PÚBLICO DE SALUD EN MANAUS, AMAZONAS, BRASIL

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RESUMO: Objetivo: Investigar as implicações da pandemia de COVID-19 sobre os serviços odontológicos e sobre a prática profissional de cirurgiões-dentistas na rede municipal de saúde de Manaus. Métodos: Estudo de métodos mistos, caracterizado como transversal, descritivo e exploratório, realizado com 81 cirurgiões-dentistas entre abril e julho de 2022. Os participantes responderam a um instrumento on-line composto por questões estruturadas e não estruturadas. Os dados quantitativos foram organizados no Microsoft Excel, no qual se procedeu ao cálculo de estatísticas descritivas (frequências absolutas e relativas). Para o tratamento das respostas qualitativas, os pesquisadores realizaram uma análise de conteúdo sistemática, com o auxílio do software Atlas.ti (Versão 22). Resultados: A análise dos dados revelou adesão geral às adequações procedimentais recomendadas no âmbito do ambiente odontológico. Ademais, os profissionais de saúde bucal participaram intensamente de iniciativas colaborativas e interdisciplinares, a exemplo dos sistemas de triagem rápida (fast-track) para COVID-19. Conclusão: Este estudo evidencia a necessidade de institucionalização dos protocolos de biossegurança adotados durante a pandemia. A manutenção desses padrões rigorosos é essencial para assegurar um nível elevado de segurança ocupacional e clínica, mitigando de forma efetiva os riscos tanto para pacientes quanto para profissionais de saúde no período pós-COVID-19.

Palavras-chave: COVID-19. Odontologia. Saúde pública.

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ABSTRACT: Objective: To investigate the implications of the COVID-19 pandemic on the dental services and on the professional practice of dentists in the municipal health network of Manaus. Methods: A mixed-methods study characterized as cross-sectional, descriptive, and exploratory, was conducted with 81 dentists from April to July 2022. Participants completed an online instrument featuring a combination of structured and unstructured queries. Quantitative data were managed in Microsoft Excel, where descriptive statistics (absolute and relative frequencies) were derived. To process qualitative responses, the researchers performed a systematic content analysis supported by the Atlas.ti (Version 22) software package. Results: Data analysis revealed a general adherence to recommended procedural adjustments within the dental environment. Additionally, dental healthcare workers participated extensively in collaborative, cross-disciplinary innovations, such as the COVID-19 fast-track triage systems. Conclusion: This study underscores the necessity of institutionalizing the biosafety protocols adopted during the pandemic. Perpetuating these rigorous standards is essential to ensuring a heightened level of occupational and clinical safety, effectively mitigating risks for both patients and healthcare practitioners in the post-COVID-19 era.

Keywords: COVID-19. Dentistry. Public health.

RESUMEN: Objetivo: Investigar las implicaciones de la pandemia de COVID-19 en los servicios odontológicos y en la práctica profesional de los cirujanos dentistas de la red municipal de salud de Manaus. Métodos: Estudio de métodos mixtos, de carácter transversal, descriptivo y exploratorio, realizado con 81 cirujanos dentistas entre abril y julio de 2022. Los participantes respondieron a un instrumento en línea compuesto por preguntas estructuradas y no estructuradas. Los datos cuantitativos se organizaron en Microsoft Excel, donde se calcularon estadísticas descriptivas (frecuencias absolutas y relativas). Para el tratamiento de las respuestas cualitativas, los investigadores realizaron un análisis de contenido sistemático con el apoyo del software Atlas.ti (versión 22). Resultados: El análisis de los datos reveló una adhesión general a los ajustes procedimentales recomendados en el ambiente odontológico. Además, los profesionales de salud bucal participaron ampliamente en innovaciones colaborativas e interdisciplinarias, como los sistemas de triaje rápido (fast-track) para COVID-19. Conclusión: Este estudio subraya la necesidad de institucionalizar los protocolos de bioseguridad adoptados durante la pandemia. Mantener estos rigurosos estándares es esencial para garantizar un mayor nivel de seguridad ocupacional y clínica, mitigando eficazmente los riesgos para pacientes y profesionales de la salud en la era pos-COVID-19.

Palabras clave: COVID-19. Odontología. Salud pública.

INTRODUCTION

Since its identification in Wuhan in 2019, COVID-19 has exerted an unprecedented burden on global health systems (PAHO, 2020). In Brazil, although the pandemic commenced in São Paulo, its impact was particularly acute in Manaus, where Intensive Care Unit saturation levels peaked at 96% in 2020 and 90% in 2021 (FVS, 2021), rendering it one of the most distressed healthcare scenarios in national history. Transmission occurs primarily through respiratory droplets, aerosols, and direct/indirect contact with mucosal membranes (FIOCRUZ, 2020). While ~80% of cases are mild or asymptomatic (PAHO, 2020), advanced age and underlying comorbidities critical determinants of severe outcomes (MAIA ABP, et al., 2020; REGIS BC, et al., 2020). Dental practitioners face heightened risks due to routine exposure

to bioaerosols, blood, and saliva (MAIA ABP, et al., 2020; IZZETTI R, et al., 2020). Consequently, health authorities issued stringent biosafety guidelines (HARREL SK, 1996), demanding a paradigm shift and structural restructuring of clinical workflows (BALDAN LC, et al., 2021). This study evaluated the impact of COVID-19 on municipal public dental services in Manaus to inform regional healthcare policies.

MATERIAL AND METHODS

This mixed-methods, observational, and descriptive study was conducted in Manaus, Amazonas, providing a complementary analysis of a previously characterized cohort (NAIFF PF, et al., 2025). The scope covered 116 healthcare facilities across four primary DISAs (North, South, East, West); the Rural DISA was excluded to prevent logistical confounding factors.

APPLICATION OF THE QUESTIONNAIRE

A semi-structured questionnaire was administered via Google Forms (distributed through email and instant messaging) to assess operational practices under SUS (BRUNELLO G, et al., 2021; CASILLAS SANTANA MÁ, et al., 2021; GÓMEZ-CLAVEL JF, et al., 2021). The survey contained two thematic blocks: (1) professional implications (absenteeism, clinical conditions, workflow changes, personal protective equipment - PPE adequacy) and (2) technical perspectives on PPE guidelines, procedural adaptations, and long-term systemic impacts.

PARTICIPANT RECRUITMENT AND ETHICAL CONSIDERATIONS

Participation was voluntary via signed digital Informed Consent Forms (ICF). Eligible subjects were active dental surgeons in municipal urban health units (UBS, USF, Polyclinics, CEOs) during the pandemic. Exclusively administrative professionals were excluded.

INCLUSION AND EXCLUSION CRITERIA

The study cohort comprised dental surgeons of both sexes actively practicing within the municipal SUS, in the urban area of Manaus, during the COVID-19 pandemic. Eligible participants included those stationed at Basic Health Units (*Unidades Básicas de Saúde* - UBS), Family Health Units (*Unidades de Saúde da Família* - USF), Polyclinics, and Dental Specialty Centers (*Centros de Especialidades Odontológicas* - CEOs). Conversely, exclusion criteria were

applied to professionals who were exclusively engaged in administrative or managerial roles, thereby ensuring the sample reflected those directly involved in clinical service delivery during the health crisis.

SAMPLE SIZE AND STATISTICAL PARAMETERS

From a target population of 287 dental professionals (CNES, May 2022; BRASIL, 2022) the minimum representative sample size was calculated at 165 (95% CI, 5% error margin) (LWANGA SK and LEMESHOW S, 1991).

ANALYSIS OF RESULTS

Out of 177 invited professionals, 82 responded (46.3%); 1 administrative professional was excluded, resulting in a final sample of n=81 (no missing data). Quantitative analysis (GraphPad Prism v10.6.0) employed Chi-square and Fisher's exact tests. Qualitative text data were processed in Atlas.ti (v22) using content analysis (BARDIN L, 2016; COHEN J, 1988) across four phases: pre-exploration, unit selection, categorization, and interpretation. Theoretical saturation was verified per established standards (GUEST G, et al., 2006).

ETHICAL PRECEPTS

Approved by the Ethics Committee of the State University of Amazonas (CAAE: 55987822.3.0000.5016) in compliance with CNS Resolutions 466/2012, 510/2016, and Circular Letter No. 1/2021-CONEP/SECNS/MS.

RESULTS AND DISCUSSION

The COVID-19 pandemic induced multifaceted implications for clinical services and the operational activities of dental surgeons. Critical disruptions included significant staffing shortages due to occupational absenteeism and health-related leave, alongside substantial fluctuations in daily patient volume. Furthermore, dental practitioners experienced a restructuring of their clinical routines and workplace reassignments. These changes were accompanied by essential infrastructural adaptations within the dental environment and the rigorous enhancement of sanitary protocols, all aimed at fortifying the biosafety framework for both the oral healthcare workforce and their patients during clinical interventions.

Building upon the dataset established previously (NAIFF PF, et al., 2025), this study analyzed a cohort of 81 dental surgeons with a mean age of 45.3 years. The sample exhibited a

female predominance (72.8%) compared to males (27.2%). The majority of the practitioners possessed extensive professional experience, with over 11 years of tenure within the Brazilian Unified Health System (SUS), and approximately half the cohort having practiced for more than two decades. Regarding academic qualifications, the participants demonstrated a high level of specialization; 96.3% held postgraduate degrees, with 17.3% attaining a Master's degree and an identical percentage (17.3%) holding a Doctorate. Only a marginal fraction (3.7%) of the professionals had not pursued postgraduate education at the time of data collection.

Regarding the sample size, although the final cohort (n=81) did not attain the initially projected sample size (n=165), several multifaceted factors likely influenced the response rate. These include "survey fatigue" induced by the proliferation of digital questionnaires during the pandemic, time constraints among frontline healthcare providers, and a potential reduction in the emotional bandwidth required for research engagement (NAIFF PF, et al., 2025; VASCONCELLOS-GUEDES L and GUEDES LFA, 2007). Furthermore, the historical over-saturation of lengthy survey instruments within professional networks has been documented to create substantial barriers to participation in subsequent academic inquiries.

Nevertheless, a *post-hoc* power analysis supports the statistical integrity of the findings. To achieve a conventional statistical power of 80% (1- β = 0.80) for detecting a medium effect size (Cramer's V=0.33), a sample of approximately 87 participants was required. The current sample of 81 practitioners closely approximates this threshold, indicating that the study remains sufficiently powered to identify significant associations between the variables analyzed. This proximity to the calculated ideal parameters reinforces both the internal validity of the data and the overall adequacy of the sample relative to the research objectives.

Furthermore, from a qualitative and descriptive perspective, a sample of 81 participants significantly exceeds established saturation thresholds, which typically stabilize between 12 and 20 respondents in thematic health research (GUEST G, et al., 2006). Consequently, the response rate achieved provides a robust foundation for delineating the regional professional panorama in Manaus. While the extrapolation of these data requires the usual cautionary measures regarding generalizability, the depth of the gathered insights offers a critical high-resolution view of the municipal dental network's response to the pandemic crisis.

In the municipal health network of Manaus, the pandemic precipitated a significant wave of occupational absenteeism among oral health professionals. A substantial majority of dental surgeons (83.9%, n = 68) were compelled to withdraw from clinical duties between 2020

and 2022 due to one or more COVID-19-related factors. Specifically, temporary leave was attributed to the manifestation of influenza-like symptoms (31.6%, n=25); laboratory-confirmed SARS-CoV-2 infection (67.1%, n=53); and direct exposure to infected individuals (17.7%, 14). Additionally, pre-existing comorbidities (7.6%, n= 6) and other miscellaneous causes (13.9%, n = 11) necessitated further absences.

While the mean duration of absenteeism was 10 days, several cases exhibited prolonged clinical instability or administrative leave. These outliers included 94 days due to post-acute COVID-19 complications, four months for high-risk comorbidity management, and periods extending to nine months for pregnancy-related leave. Critically, these disruptions were not limited to dentists; reports indicated parallel rates of absenteeism among auxiliary dental assistants and oral health technicians, further compromising the operational capacity of the multidisciplinary oral health team.

Regarding institutional modifications, most practitioners observed a reduction in the workforce available for active duty. This attrition corresponded with a reported decline in the aggregate volume of patients treated within the municipal dental services following the pandemic's onset.

Dental services at the municipal level were predominantly restricted to emergency and urgent care interventions during the most critical epidemiological stages of the COVID-19 pandemic, specifically those classified under "red" or "purple" risk tiers. This strategic shift in service delivery aimed to mitigate cross-contamination risks while ensuring the management of acute odontogenic conditions during periods of high viral transmission and stringent mobility restrictions.

Concerning the workforce composition, most municipal dental services reported a decrease or reduction in personnel available for active duty (64.2%, n = 52), while 34.6% (n = 28) reported no significant change and only 1.2% (n = 1) reported an increase. Patient throughput followed a similar pattern, with the vast majority of services (97.6%, n = 79) reporting a decrease in the volume of patients treated, against 1.2% (n = 1) reporting an increase and 1.2% (n = 1) reporting no change. In terms of clinical care modalities, most services restricted care to emergency and urgent interventions only (67.9%, n = 55); services were totally suspended in 29.8% (n = 24) of cases, and only 2.5% (n = 2) maintained the full spectrum of elective and non-elective care.

The depletion of the oral healthcare workforce during the pandemic was driven by a multifaceted set of systemic and individual factors. Primarily, the temporary decommissioning of specific healthcare facilities and the mandated suspension of elective dental procedures necessitated a significant restructuring of personnel. Furthermore, acute infrastructural constraints significantly limited operational capacity; in facilities with shared clinical bays, social distancing requirements often restricted operations to a single dental chair, forcing practitioners into rotational shifts. Beyond these logistical barriers, the workforce was further diminished by direct health-related impacts, including SARS-CoV-2 infection, long-term sequelae (Post-Acute Sequelae of COVID-19), and occupational mortality. These disruptions exacerbated the pre-existing scarcity of human resources within the dental sector of the Brazilian Unified Health System.

In alignment with municipal contingency plans (MANAUS, 2020a), elective dental services were suspended during the most critical epidemiological phases to prioritize emergency care and mitigate viral transmission. This period was characterized by a strategic "task-shifting" approach, where dental surgeons were redeployed to multidisciplinary frontline teams. Responsibilities were diverted toward the pandemic response, including clinical triage, diagnostic testing, telemonitoring, and large-scale immunization campaigns (MANAUS, 2020b). Smaller health units were temporarily shuttered, with their respective oral health teams redistributed to high-complexity facilities or administrative roles. This institutional maneuver, while essential for the immediate crisis response, fundamentally altered the professional workflow and temporarily marginalized routine oral healthcare delivery within the municipal network

Following the pandemic's onset, a substantial reduction in the daily provision of dental appointments was observed across the majority of municipal services. This strategy served as a critical mitigation measure to limit population mobility and minimize the performance of high-risk procedures, particularly in periods characterized by PPE supply chain instability and quantitative deficits. However, as noted by Danigno JF, et al. (2022), such restrictive measures likely contributed to the accumulation of a significant suppressed demand, potentially leading to the clinical deterioration of the population's oral health status over time.

Conversely, qualitative data from the participants suggest that the reduced patient volume per shift enabled a transition toward "single-visit dentistry" or clinical optimization. This approach prioritized maximizing procedural output within a single session, thereby

minimizing follow-up appointments and reducing recurrent viral exposure for both patients and staff. Furthermore, this shift fostered economic efficiencies; it reduced patient-related transportation costs and lowered the longitudinal consumption of PPE, representing a strategic optimization of public health expenditures during a period of fiscal and resource scarcity.

Quantitative analysis revealed that 60% (n=48) of respondents were redeployed to non-dental healthcare services. Notably, 59% (n=36) of these professionals reported a perceived lack of adequate preparedness for their reassigned roles, highlighting a gap in emergency occupational training. The documented redeployment activities encompassed a wide spectrum of frontline operations, including patient flow coordination, pharmaceutical support, immunization campaigns, telemonitoring, and COVID-19 clinical triage and diagnostic testing. In contrast, 40% of the dental surgeons were not redeployed, as they were either maintaining urgent dental care services or were on official leave due to health-related absenteeism.

Regarding the specific redeployment activities, the most frequent assignment was patient reception and initial assessment (24.7%, n = 20), followed by COVID-19 clinical triage and risk screening (11.1%, n = 9) and administrative and managerial support (8.6%, n = 7). Smaller proportions of professionals were allocated to pharmaceutical service support and remote patient monitoring/telemonitoring (2.5% each, n = 2), immunization and vaccine administration (3.7%, n = 3), and, less frequently (1.2%, n = 1 each), patient flow coordination and logistics, access control and facility entry management, front-desk and administrative intake, diagnostic testing and sample collection, and multi-sectoral involvement across several of these activities simultaneously. No professional redeployment occurred for 40.7% (n = 33) of respondents.

The finding that a majority of respondents felt inadequately prepared for their redeployed roles is particularly concerning, especially considering that most were assigned to User embracement/Patient intake (*Acolhimento*). According to the Brazilian National Humanization Policy (PNH), this function is a transversal responsibility shared by all healthcare team members (BRASIL, 2010). This perceived lack of readiness underscores an urgent need for institutional management to develop and implement robust permanent education strategies. Such initiatives must be meticulously planned to ensure that dental surgeons possess the requisite competencies to navigate interprofessional roles beyond conventional clinical practice.

The strategic integration of dental surgeons into the COVID-19 frontline has catalyzed a critical re-evaluation of their role within a broader and more proactive public health framework. This historical juncture facilitated the strengthening of interprofessional collaborative practice and integrated oral health teams more deeply into the strategic planning of Primary Health Care (PHC). Capitalizing on this momentum requires a comprehensive reappraisal of the professional scope of practice. As highlighted by Carletto AFS and Fernandes F (2020), it is essential to reframe the systemic relevance of dental professionals in the context of global health emergencies, moving beyond specialized surgical-restorative paradigms toward a more versatile participation in health surveillance and emergency response.

INFECTION CONTROL AND BIOSAFETY MITIGATION MEASURES

To mitigate SARS-CoV-2 transmission within municipal dental facilities, a substantial escalation in the implementation of multifaceted infection control protocols was observed. These measures predominantly involved administrative and environmental adaptations, including the spatial reconfiguration of waiting areas to ensure physical distancing, the restriction of patient companions, and the limitation of both daily patient throughput and waiting room occupancy. Furthermore, screening and scheduling protocols were digitized through telephonic triage and the integration of teledentistry/virtual consultation platforms. At the point of care, non-contact infrared thermometry, rigorous hand antisepsis with 70% ethyl alcohol, and the prioritization of natural ventilation (passive airflow optimization) became standard practice.

Comparative analysis indicates that several core strategies were entirely absent from clinical routines prior to the pandemic. These include the systematic avoidance of Aerosol-Generating Procedures (AGPs), universal infrared thermometry, and the deployment of teledentistry and advanced air filtration systems. Notably, although high-efficiency particulate air (HEPA) filtration and high-volume evacuators (HVE) were introduced, their implementation was reported to a lesser extent compared to administrative measures. While other standard precautions were present in some capacity before the health crisis, their rigor and frequency of application significantly diverged during the pandemic, as detailed in Table1.

Table 1 - Implementation of enhanced sanitary and preventive protocols in municipal dental facilities before (pre) and after (post) the emergence of COVID-19 (Manaus, Amazonas, 2022).

Implemented Mitigation Protocols	Pre* n (%)	Post* n (%)
Surface disinfection protocols (pre-, intra-, and post-consultation)	68 (84)	70 (86.4)
Physical distancing within the waiting area	1 (1.2)	67 (82.7)
Restriction of patient companions within the clinical setting	15 (18.5)	67 (82.7)
Avoidance of Aerosol-Generating Procedures (AGPs)	0 (0)	75 (92.6)
Use of absorbable sutures (to minimize follow-up visits)	4 (4.9)	2 (2.5)
Hand hygiene with soap and water	54 (66.7)	64 (79)
Reduction of daily patient throughput	5 (6.2)	78 (96.3)
Occupancy limits for the waiting area	7 (8.6)	68 (84)
Non-contact infrared thermometry screening	0 (0)	37 (45.7)
Telephonic triage and appointment scheduling	4 (4.9)	23 (28.4)
Teledentistry and virtual consultation platforms	0 (0)	19 (23.5)
Hand antisepsis with 70% ethyl alcohol	31 (38.3)	80 (98.8)
Mandatory use of rubber dam isolation whenever feasible	7 (8.6)	7 (8.6)
Implementation of air filtration systems (e.g., HEPA or HVE)	0 (0)	1 (1.2)
Use of High-Volume Evacuators (HVE)	2 (2.5)	3 (3.7)
Natural ventilation optimization (open windows)	5 (6.2)	50 (61.7)

Source: Naiff PF and Passos SMA, 2026. Prepared by the author based on the responses to the questionnaire (2024).
*More than one answer option. The sum of the percentages does not necessarily have to be 100%

Within the dental clinical environment, pre-existing cross-infection control measures were rigorously reinforced during the pandemic. These traditional protocols encompassed the systematic use of PPE, including protective eyewear, surgical caps, masks, disposable shoe covers, and medical-grade gloves, alongside the application of disposable physical barriers on high-touch surfaces, such as dental light handles, operator stool levers, and suction handpieces (HARREL SK, 1996). In response to the high risk of aerosolized transmission, public health authorities issued supplemental mandates for enhanced protection, specifically the mandatory use of face shields, fluid-resistant disposable gowns, and N95/FFP2 filtering facepiece respirators. The vast majority of the surveyed dental surgeons expressed a consensus that these heightened biosafety standards should be permanently integrated into clinical practice in the post-pandemic era.

According to the dental surgeons' reports, a substantial portion of the Brazilian Ministry of Health (MoH) guidelines for dental practice during the pandemic was successfully integrated into the municipal health services. However, a significant implementation gap was identified regarding structural modifications and environmental engineering controls. Specifically, the installation of full-height physical partitions in open-plan multi-chair clinics and the deployment of advanced air renewal or filtration systems were not universally adopted;

most facilities remained structurally unaltered. These infrastructural deficiencies represent a critical breach in biosafety protocols, potentially facilitating the cross-transmission of SARS-CoV-2 and other airborne pathogens through the persistent dissemination of bioaerosols within the clinical environment.

Currently, empirical evidence remains insufficient to establish a definitive "safe distance" between dental units for performing Aerosol-Generating Procedures (AGPs) in multi-chair clinical settings. Consequently, this underscores the critical necessity of implementing the aforementioned, yet unadopted, engineering controls to mitigate cross-contamination risks (ANVISA, 2023).

It is an institutional prerogative of the public health system to ensure the full and safe utilization of its installed service capacity. Therefore, it is imperative to develop comprehensive workplace adaptation strategies and robust supply chain policies. These must address the procurement of consumables, surgical instrumentation, and the systematic maintenance and replacement of dental equipment to guarantee occupational conditions that strictly adhere to the standards mandated by the National Health Surveillance System (BRASIL, 2004). Regarding the provision of PPE, dental surgeons reported varying levels of institutional support from the municipal administration. While the essential materials required to maintain biosafety standards were officially designated for distribution, the data reveal significant logistical inconsistencies. Participants noted critical intervals during the pandemic characterized by quantitative supply deficits or complete stockouts of indispensable PPE. Only a marginal proportion of the respondents reported uninterrupted access to protective gear throughout the health crisis (Table 2).

Table 2 - Provision and availability of Personal Protective Equipment (PPE) for dental services during the COVID-19 pandemic (Manaus, Amazonas, 2022).

PPE	n (%)*
Fluid-resistant disposable gowns	65 (80.2)
Medical grade gloves	77 (95.1)
Fluid-resistant surgical masks	70 (86.4)
N95/FFP2 filtering facepiece respirators	79 (97.5)
Protective eyewear / Safety goggles	73 (90.1)
Disposable shoe covers	27 (33.3)
Disposable surgical caps	78 (96.3)
Face shields	74 (91.4)
PPE Availability	
Consistently available throughout the period	15 (18.5)
Occasional supply interruptions / Stockouts	27 (33.3)
Quantitative supply deficits at specific intervals	48 (59.3)

Source: Naiff PF and Passos SMA, 2026. Prepared by the author based on the responses to the questionnaire (2024).
*More than one answer option. The sum of the percentages does not necessarily have to be 100%

The reported PPE shortages probably occurred during the initial and most critical phases of the pandemic, driven by an unprecedented surge in emergency demand that far exceeded global production capacity. This systemic failure resulted in the collapse of numerous healthcare infrastructures worldwide. Specifically, health systems in low- and middle-income nations disproportionately endured the repercussions of workforce depletion and acute supply shortages, with the scarcity of Personal Protective Equipment emerging as a critical vulnerability.

The unavailability of adequate PPE transcends logistical failure, as it directly exposes healthcare workers and their families to substantial biohazards and facilitates the broader dissemination of the virus. Beyond the physiological risk, the quantitative and qualitative deficit of protective gear has been significantly associated with heightened levels of psychological distress, manifesting as acute anxiety and fear. This emotional burden is rooted in the perceived risk of self-contamination, the potential for clinical cross-contamination between patients, and the profound concern regarding the transmission of pathogens to household members (LUZ EMF, et al., 2020).

PROFESSIONAL PERSPECTIVES ON THE SUSTAINABILITY OF WORKPLACE ADAPTATIONS

Regarding the procedural and structural modifications implemented during the pandemic that should be permanently integrated into dental services, a high degree of consensus was observed among dental surgeons. According to professional priority, the following measures were highlighted as essential for long-term retention: the systematic optimization of biosafety protocols, a strategic reduction in daily patient throughput, and the mitigation of crowding within the clinical environment. Furthermore, participants emphasized the importance of maintaining pre-consultation hygiene standards (e.g., rigorous hand sanitization with soap and water or 70% ethyl alcohol), as well as clinical triage and telephonic appointment scheduling. Structural adaptations to the workplace and full adherence to all MoH clinical guidelines were also prioritized as permanent enhancements. Conversely, a minority of respondents expressed the view that no discernible modifications should be maintained in the post-pandemic era (Table 3).

Table 3 - Professional perspectives on the retention of pandemic-induced workplace modifications in long-term dental practice (Manaus, Amazonas, 2022).

Workplace and Procedural Adaptations	n (%)*
Telephonic appointment scheduling and pre-screening	1 (1.2)
Structural and infrastructural workplace modifications	8 (9.8)
Physical distancing protocols	14 (17.2)
Pre-consultation hygiene and sanitization protocols	13 (16)
Optimization of biosafety and infection control frameworks	51 (62.9)
Strategic reduction in daily patient throughput	27 (33.2)
Clinical triage and risk stratification	9 (11.1)
Adherence to all Ministry of Health (MoH) guidelines	11 (13.5)
No discernible modifications implemented	1 (1.2)

Source: Naiff PF and Passos SMA, 2026. Prepared by the author based on the responses to the questionnaire (2024).
*More than one answer option. The sum of the percentages does not necessarily have to be 100%

The perceived relevance of PPE varied according to the risk of bioaerosol dissemination. For Non-Aerosol-Generating Procedures (Non-AGPs), dental surgeons prioritized the use of disposable caps, medical-grade gloves, and fluid-resistant gowns, followed by protective eyewear. Notably, N95/FFP2 respirators and face shields were also highly ranked, surpassing the perceived importance of standard surgical masks and shoe covers in this category.

Regarding AGPs, the hierarchy of professional importance shifted toward maximum barrier protection. In this context, fluid-resistant gowns, disposable caps, and gloves were identified as the most critical items, followed immediately by N95/FFP2 respirators and face shields. Protective eyewear, shoe covers, and surgical masks occupied the lower tiers of perceived necessity for high-risk interventions (Table 4). This professional consensus aligns with a heightened risk-aversion strategy, reflecting a cautious approach to occupational biohazards in a highly contaminated clinical environment.

Table 4 - Dental surgeons' perceptions regarding mandatory Personal Protective Equipment (PPE) based on the generation of aerosols during clinical interventions (Manaus, Amazonas, 2022).

PPE	AGPs n (%)*	Non-AGPs n (%)*
Fluid-resistant disposable gowns	81 (100)	75 (92.6)
Face shields	80 (98.8)	57 (70.4)
Medical-grade gloves	81 (100)	80 (98.8)
Fluid-resistant surgical masks	80 (98.8)	46 (56.8)
N95/FFP2 filtering facepiece respirators	43 (53.1)	61 (75.3)
Protective eyewear / Safety goggles	72 (88.9)	70 (86.4)
Disposable shoe covers	72 (88.9)	46 (56.8)
Disposable surgical caps	81 (100)	80 (98.8)

Source: Naiff PF and Passos SMA, 2026. Prepared by the author based on the responses to the questionnaire (2024).
*More than one answer option. The sum of the percentages does not necessarily have to be 100%

To capture a comprehensive understanding of the crisis, participants were invited to provide unstructured qualitative feedback regarding the broader implications of the pandemic on their professional practice. The resulting narratives were categorized into thematic repercussions, reflecting the complex interplay between clinical operations, psychological well-being, and institutional dynamics. These professional insights, which elucidate the multifaceted challenges faced within the municipal health network, are synthesized and presented in Table 5.

Table 5 - Implications of the COVID-19 pandemic for dental surgeons' professional practice and service delivery (Manaus, Amazonas, 2022).

Dimension / Category of Impact	n (%)*
Adverse Professional Implications	
Elevated levels of occupational stress and burnout	3 (3.7)
Increasead suppressed treatment demand	3 (3.7)
Disruption of Primary Health Care (PHC) essential services	1 (1.2)
Assignment of non-dental / diversionary clinical roles	2 (2.4)
Professional demotivation and reduced job engagement	2 (2.4)
Perceived lack of professional recognition	1 (1.2)
Occupational vulnerability and perceived clinical risk	12 (14.8)
Reduction in professional earnings / Income loss	1 (1.2)
Constructive Outcomes and Advancements	
Workplace environment enhancements	4 (4.9)
Continuing professional development and skill acquisition	2 (2.4)
Optimization of surface disinfection protocols	7 (8.6)
Enhanced prioritization and valuation of biosafety standards	38 (46.9)
Strategic reduction in patient throughput (for safety)	9 (11.1)
Professional fulfillment / Job satisfaction	1 (1.2)
Adoption of more prudent / cautious clinical practices	23 (28.3)
No discernible professional impact	3 (3.7)

Source: Naiff PF and Passos SMA, 2026. Prepared by the author based on the responses to the questionnaire (2024).
*More than one answer option. The sum of the percentages does not necessarily have to be 100%

A significant proportion of dental surgeons was redeployed following the mandatory suspension of elective procedures, which constitute the core of both primary and specialized oral healthcare within the municipal network. Conversely, a subset of the workforce remained dedicated to urgent and emergency dental care, while others experienced occupational absenteeism due to SARS-CoV-2 infection or related health complications. The administrative mandate to restrict clinical practice to emergency interventions triggered substantial concern regarding the economic implications of such constraints (BERTEVELLO R, 2022). This is particularly relevant given the prevalence of dual-practice models, where a considerable share of these professionals derives a portion of their income from private clinical practice (PASSOS SMA, 2019). This abrupt systemic reconfiguration, coupled with the high risk of contamination, subjected these practitioners to a distinct paradigm of operational and

psychological stress (NAIFF PF, et al., 2025). Systematic institutional efforts are required to ensure satisfactory working conditions, encompassing functional stability and occupational security. Such factors are paramount to fostering professional motivation and sustained commitment within the Family Health Strategy (FHS) framework (REIS WG, et al., 2015). Data indicate that over half of the FHS dental workforce in the Manaus municipal network maintains concurrent activities in private clinical settings (PASSOS SMA, 2019). This high prevalence of dual-practice models suggests that public sector compensation may be insufficient to ensure financial autonomy. Furthermore, the absence of stable employment ties, coupled with the excessive workloads inherent in a 30-to-40-hour weekly commitment to PHC, may compromise the quality of service delivery and lead to significant professional burnout.

The persistent challenges and systemic failures associated with the chronic underfunding of SUS, alongside the absence of strategic planning for public health policy implementation, constitute primary barriers to effective service delivery. These structural bottlenecks have historically hindered satisfactory responses to population health needs across various regions, particularly in the state of Amazonas (ESCOBAR AL, 2020). Overcoming the repercussions of the pandemic and ensuring the preservation of life necessitates not only a substantial expansion of public health investments but also the implementation of continuous epidemiological monitoring and rigorous control frameworks.

Furthermore, it is imperative to conduct granular analyses of the pandemic's impact on specific healthcare sectors, with a particular emphasis on oral health services. To guide the development and refinement of effective public oral health policies in the COVID-19 and post-pandemic eras, an in-depth understanding of the specific context, operational demands, and systemic requirements of the dental sector is essential. Evidence-based policymaking in this field must be rooted in the lived clinical and administrative realities of the public workforce to ensure the resilience and efficacy of the municipal health network against current and future sanitary crises.

Limitations of this study include the cross-sectional design (preventing causal inferences), recall bias in self-reported PPE access, and focus restricted to the Manaus municipal public network.

CONCLUSION

The COVID-19 pandemic reshaped public dental workflows in Manaus, exposing structural vulnerabilities while establishing higher biosafety standards. Professional consensus supports permanent integration of enhanced infection control. Future policy must prioritize investments in environmental engineering controls, permanent education, and workforce stability to build resilient public dental services for future sanitary crises.

ACKNOWLEDGMENTS

The authors wish to honor the memory of Tania França, whose untimely passing occurred prior to the publication of this work. Tania was instrumental in the conceptualization, methodology, and formal analysis of this study. As a project administrator and supervisor, her leadership and vision were foundational to the successful execution of this research. We are deeply grateful for her invaluable contributions and her dedication to the field.

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