ORIGINAL REPORT: QUALITATIVE RESEARCH

Dentists' Perceptions of Personal Infection Control Measurements in Response to COVID-19

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Abstract: ***Objective:*** *To explore through focus groups (FGs) the perceptions of dental practitioners (DPs) from different countries of the challenges of implementing coronavirus disease 2019 (COVID-19) related biosafety measures, especially personal protection equipment (PPE), during the COVID-19 pandemic period.*

Methods: *DPs from Colombia, Germany, the United Kingdom, and the United States were invited to participate in country-based FGs. These were facilitated by an experienced moderator who explored the factors that guided the implementation of COVID-19 related biosafety measures and PPE use. Data were analyzed through thematic analysis on the basis of categories defined by the researchers deductively and inductively.*

Results: *A total of 25 DPs participated in 3 FGs (Colombia:* n = *8; United Kingdom:* n = *7; United States:* n = *9) and 1 in an in-depth interview (Germany). DPs described using several processes to judge which guidance document to adopt and which aspects of the guidance were important in their practice. These included making judgments concerning the views of any indemnity organization to which the DPs were responsible, the staff's views in the practice, and the views of patients. In the absence of a single overarching guidance document, DPs filtered the available information through several considerations to find a level of PPE that they deemed "implementable" in local practice.*

Conclusions: *The findings suggest that the implementation of evidence-based practice is subject to modification through a lens of what is "feasible" in practice.*

Knowledge Transfer Statement: *Clinicians, educators, and policy makers can use the results of this study to understand the process through which guidance is transformed into implementable patient care pathways in the dental practice.*

Keywords: dental health services, infection control, biosafety, clinical practice guidelines, dental public health, psychosocial factors

Introduction

Dental practitioners (DPs) are exposed to pathogens due to their close proximity, face-to-face contact with patients, and aerosol-generating procedures (AGPs) during dental care (Dar Odeh et al. 2020; Meng et al. 2020). In 2019, the third outbreak of an infection caused by a coronavirus emerged in less than 20 y (Drosten et al. 2003; World Health Organization [WHO] 2020). The new beta coronavirus, severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2), was identified as the trigger for the coronavirus disease 2019 (COVID-19). SARS-CoV-2 has been detected in saliva (To et al. 2020) and a viral transmission through AGPs has been identified (Orenes-Piñero et al. 2021; Samet et al. 2021).

After March 2020, when the pandemic was declared, elective dental care in

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dental services was ceased globally due to a lack of appropriate related biosafety clinical management guidelines. In April 2020, recommendations and guidance for the reopening of dental services were published by governments and professional organizations, commencing with the American Dental Association (Cochrane Oral Health 2020). The US Centers for Disease Control and Prevention (CDC) released the Interim Infection Prevention and Control Guidance for Dental Settings during the COVID-19 response (CDC 2020), and the WHO released its Guidance for Health Workers during Coronavirus Disease (COVID-19) Outbreak. Based on these documents, most of the countries went on to develop their own guidelines to promote safe dental care.

The most widely advocated measure to avoid the spread of SARS-CoV-2 was the implementation of enhanced personal protective equipment (PPE) for AGPs, such as disposable fluid-resistant gowns, filtering face piece (FFP) respirators, eye protection, and full-face shields (Baghizadeh Fini 2020; Verbeek et al. 2020). A challenge to the universal adoption of these measures was the lack of their availability and the related high prices of such equipment. The pandemic situation triggered pressure on private DPs and struggling public oral health care systems due to the need of implementing new protocols, enhanced PPE and its shortages, and the general anxiety fueled by inconsistent information about the COVID-19 pandemic (Coulthard 2020).

The aim of the present study was to explore the perceptions of DPs residing in 4 countries of the challenges of implementing the use of enhanced PPE and additional infection prevention and control measures during the COVID-19 pandemic period.

Methods

Institutional review board approval was given by the Universidad El Bosque (identification number UEB-561-2020). Qualitative data were obtained through focus group discussions aiming to explore the factors that influence the use of PPE in dental practice. In order to obtain views from a broad range of health care systems, we decided to invite DPs from 4 countries (Colombia: n = 13; Germany: n = 13; United Kingdom: n = 8; United States: n = 21). These represented a range of majority publicly funded, privately funded, insurance schemes, and mixed funding approaches that we felt a priori were likely to influence the uptake of guidance. A total of 4 online meetings were held covering a wide range of topics restricted to 5 guiding questions concerning how DPs were dealing with their personal protection. The focus groups were moderated by an expert researcher (JTN); rapporteurs (VA, EOB, SM) took notes and contributed with additional questions.

Characteristics of Participants

An invitation to join the focus group (FG) was sent to DPs through an academic network that had been formed as part of a separate caries-prevention research program. The initial goal was to recruit 8 DPs in each country. We sought to have representation from different clinical practice areas in each country and DPs not exclusively working in academic settings. In addition, the researchers sought as far as possible to recruit participants of both genders, different areas/regions in each country, and a broad range of age groups. Each participant was asked to agree to his or her participation and confidentiality by signing the written informed consent. This invitation process started when vaccines were not yet available (June 2020).

Conduct of the Focus Groups

Each focus group meeting was conducted online and lasted from 60 to 90 min. All were audio recorded for analysis. The moderator introduced the overall aims of the project, the importance of PPE, and biosafety during the dental care. Five guiding questions were previously agreed on by the research team with follow-up questions guided by the moderator, who adopted a naive approach to the topics. The 5 guiding questions were as follows:

1. What PPE do you use?
2. How do you decide what PPE to use?
3. Where do you get information about PPE from?
4. Is it easy or difficult to follow the guidance?
5. How would you advise a new dentist just joining the profession about PPE?

Discussions were conducted in English. In Colombia and Germany, English is not the native or majority language, but the decision to conduct the FGs in this language was taken based on the fact that it was a common language for the researchers involved. It was established as one of the inclusion criteria in the recruitment of DPs. The meetings were held between September 2020 and March 2021.

Data Analysis and Information Validation

Audio recordings were transcribed and analyzed line by line in order to categorize the data obtained in the discussions. Three a priori categories were defined:

- Sources of information identified
- Barriers to adhering to PPE
- Impact of changes

Through the technique of constant comparison, utterances falling into these 3 coding categories were identified. Coding was independently conducted by 2 coders. Where dissimilarities in coding were identified, the 2 coders met to discuss the coding, referring to the core definitions of each code and reconciled the coding through discussion.

Results

In total, 3 FG discussions were held (Colombia: June 2020; United States: June 2020; United Kingdom: September 2020) and 1 individual meeting (Germany: May 2021). Focus groups

Table.
Characteristics of the Focus Group Participants.

Country	DPs (*n*)	Areas/ Regions by Country (*n*)	Sex (%)		Type of Dental Practice (%)			Years of Practice (Mean ± SD)
			Female	Male	State Health Provider	Private	Both	
Colombia	8	5	100	0	12	63	25	22 ± 10.3
Germany	1	1	0	100	100	0	0	20
United Kingdom	7	6	43	57	100	0	0	18 ± 6
United States	9	5	78	22	28	51	21	28 ± 13

To obtain a broad range of views, we invited dental practitioners (DPs) from 4 countries based on the following considerations: timing of guidance development, availability of personal protective equipment (PPE), and funding system. The first guidance on biosafety dental practice emerged from the United States and United Kingdom. In Colombia, research has previously identified restrictions in the availability of PPE, and there was little published information about dental practice in Germany at the time of the study. The 4 countries represent a range of funding models for dental health care, as noted previously.

were conducted before vaccination availability and the latter afterward. In total, 25 DPs took part in the focus groups, corresponding to 45.4% of invited DPs. The characteristics of the participants are described in the Table.

Following the analysis of the data, the first a priori theme, "sources of information identified," was renamed and expanded. The 2 other a priori codings were not changed. The overall coding scheme was as follows:

1. Adoption of and adherence to guidelines
   a. Interpretation of the guideline
   b. The views of dental staff
   c. The views of indemnity providers
   d. The views of patients
   e. "Experts"
2. Barriers to adherence with PPE guidance
3. The impact of the changes

Each of the themes will be addressed in turn, with illustrations taken from the interviews and focus groups.

1. Adoption of and Adherence to Guidelines

Participants reported that they had been faced with a range of guidance produced from different sources, and this placed emphasis on the individual practitioner or team in using a method to choose which guideline (or combination of elements from different guidelines) they wished to adopt. It emerged that several factors were influential in guiding that choice, including the views of stakeholders such as the dental team, indemnity providers, and patients. The role of "experts" providing online educational opportunities was also discussed.

Participants from Colombia referred to use of the government guidance (Ministry of Health and Social Protection). Although this guide was developed based on an expert consensus (Saavedra-Trujillo 2020), the participants perceived it to be complex and lacking in specific guidance for implementation. As a consequence, other guidelines were used such as those from dental societies (American Academy of Pediatric Dentistry, Colombian Academy of Pediatric Dentists) and service funders/ providers (dental schools, health insurance firms). In addition, DPs said that they relied on colleagues' experiences, their own reading, or webinars to guide their practice. A perception of the lack of consensus between the various documents, as well as the relationship between guidelines and personal experience, was expressed by the participants. For this reason, they considered that there was a need to make an individual/personal decision about the PPE and biosafety in the dental care.

In addition, in this category, the German participant referred to a process of learning and refinement of guidelines through discussions across the profession. Following the development of protocols by German dental associations and the university departments, a consensus process was conducted across practitioners within the dental school and subsequently adopted.

In the United Kingdom, DPs identified that the 4 countries comprising the United Kingdom each provided different guidelines, which did not agree on certain details. A perception of a lack of clarity and leadership was reported. Participants felt that the Faculty of General Dental Practice UK (FGDP UK) gave very clear guidance, identifying simple rules for "risk mitigation." Practitioners reported taking the most stringent guidance and adopting that, in order to ensure they were not open to criticism, and discussed a culture of fear—that there would be serious consequences for a practitioner who failed to comply with guidance should there be an adverse event. There was an agreed perception that there existed a culture that was unsupportive, critical, and litigious. Members of the dental team reported feeling "judged."

DPs described a process of adapting guidance for local practice through considerations of

- The views of the staff
- Indemnity providers (liability issues)
- The views of the patients (some of whom commented on the lack of sense in recommendations)

Finally, the DPs reported the emergence of a number of "experts" who provided webinars and other forms of training for the dental team. However, they felt that it was difficult to judge their quality, unless they were associated with teams and institutions that had been pioneering evidence-based practice for some time, such as the Scottish Dental Clinical Effectiveness Programme.

The US participants mainly referred to the guidance produced by the CDC. They considered that guidance issued by professional organizations often conflicted with CDC guidelines. These included the American Dental Association (ADA) guidelines and those issued by state-level dental associations. DPs highlighted that personal beliefs often were used as the basis for developing an optimal practice through perceptions of what actions were "logical" and "implementable."

2. Barriers to Adherence with PPE Guidance

The barriers to adherence with PPE guidance included simple physical access (the availability of the required PPE equipment), the challenge of implementing a new and unfamiliar workflow (how people move through the dental office), and cultural and interpersonal barriers.

Colombian DPs reported that PPE led to communication problems with patients, including a clash with cultural beliefs and values. The Colombian population places great value on social interaction, including in health care settings—PPE was perceived as a barrier to this, particularly when the practitioner was working with children. DPs reported, "The thing that has really changed are all those protocols to interview the patients before you can attend them." In addition, the fallow time between patients was a special concern between Colombian DPs: "The waiting time between patients is difficult to establish, and we have to generate safe spaces. Not only the coronavirus but also other respiratory viruses can be suspended in the air." As a consequence, DPs were concerned that patients may choose to delay seeking dental care. The physical strain of wearing PPE was reported too, mainly associated with heat and making breathing more difficult. On the other hand, DPs indicated PPE was not always available, and reuse had to be considered because of the shortages in some cases. DPs said, "One of the problems that we face, have been trying to adjust to the new protocols, and the access or availability to the PPE. They have been running out very fast, there are some institutions that have priority to buy them, and the prices have gone up." As a consequence, high costs were reported as limiting strict adherence to guidelines.

DPs from the United Kingdom also reported the physical access to PPE and lack of clear guidance on the use of PPE as a barrier to adoption. The need to restructure the physical space and the patient flow and staffing issues were also reported, with staff isolating or infected with COVID-19.

Participants in the United States reported the following barriers to adhering to PPE: physical strain, reluctance of staff to comply, availability of staff, and "having child care responsibilities or off sick, isolating." In Germany, restrictions in obtaining PPE were reported, as well as the additional costs and the acceptability of the PPE to patients.

3. The Impact of the Changes

The COVID-19 pandemic raised a number of issues for the dental team ranging from concerns about individual safety to concerns about the financial viability of the practice. Paradoxically, some changes introduced as a result of the pandemic had a positive and supportive impact on the well-being of the team—for example, enhancing the social cohesion of team members.

The Colombian DPs reported concerns about being contaminated themselves or contaminating their family with SARS-CoV-2, with some suggesting that it was the first time they had been fearful about the practice of dentistry. In the United Kingdom, the business impact was at the forefront of discussion, including the costs of following all aspects of the guidance such as the direct costs of PPE and the indirect costs of reduced patient flow. A perceived shift in treatment provision was noted with an increased likelihood of extracting posterior teeth and the avoidance of complex operative care. In addition, DPs highlighted broader issues of access to dental services and a shift to preventive care. This change was challenging, particularly under the UK funding model. In addition, dentists who were leading the dental team reported feeling that their professional freedom was challenged by their perceived need to adhere to the recommendations. They also reported additional stress as a result of leading the team in a new way of working; "being the person the team look for giving the answers is very stressful."

Some dental personnel were redeployed to other health care settings, and others were paid to stay at home through a government initiative termed *furlough*. On the other hand, redeployed staff often found it challenging to return to dentistry, exhausted after working in unfamiliar and highly stressful environments.

DPs from the United Kingdom spotlighted the need to prepare patients for the new approach to PPE as it would differ from their usual experience. Furthermore, DPs in the United Kingdom felt that some of their patients were fearful of attending the dental office since it was portrayed in a variety of media as a risky environment, despite the excellence of dentists at cross-infection control.

Social media often were reported as a "source of evidence for patients," which is problematic since the source and quality of such information are varied. Practitioners in the United Kingdom felt that there had been a shift toward the delivery of preventive care (but this was acknowledged to be challenging, particularly within the UK funding model). The need for staff to be trained in a more preventive approach was also noted.

In the United States, DPs reported changes to the interactions between staff with informal gatherings such as lunchtime meetings and informal chats no longer being held. This resulted in a lowering of job satisfaction and feelings of exhaustion. As with the UK DPs, the US participants reported a change in care planning, in order to avoid complex aerosol-generating procedures.

For the German participant, the main impact related to the finances of the practice since they incurred additional costs to implement the PPE but were not reimbursed as the national dental funding has fixed fees for dental procedures.

Discussion

The COVID-19 pandemic created a great deal of uncertainty within dental practices concerning the required PPE and the types of procedures that could be undertaken. Guidance was generated in a rapid fashion and implemented nationally through a variety of sources. This study explores how practitioners made decisions about the adoption of and adherence to the guidance. The findings have implications for our understanding of both the specific issue of how practitioners responded to the COVID-19 pandemic, as well as the more general adoption of evidence-based guidance.

Across all participant groups, there was a perception that while there was general agreement on how to ensure a low risk of infection in the dental practice, the practical implications were less clear. This high level of agreement on the principles of cross-infection control has also been reported by Kamate et al. (2020), in a survey of participants living in Asia, Americas (North and South), Europe, Africa, and Australia. We found little evidence of differences in knowledge among participants by age and duration of practice, mirroring the work of Quadri et al. (2020).

The respondents reported using a variety of heuristics to guide the implementation of the particular PPE guidance that they had chosen. These included their perception of the degree to which the guidance was deemed "logical" and "implementable." While the basis for these decisions varied across countries and between individuals, the general principle appeared to focus on the balance of being able to maintain patient flow, income generation within the practice with factors such as the availability of PPE, and the perceived risk of noncompliance with certain aspects of the guidance. For example, one way of achieving this balance was a shift to virtual appointments or emergency-only appointments. In countries such as Norway and China, twice as many patients attended appointments by telephone compared to in-person clinical care (Stangvaltaite-Mouhat et al. 2020; Yang et al. 2020), where numerous public dental hospitals only treated emergencies (Yang et al. 2020).

The challenge to the implementation of guidance that resulted from resource limitations and pipeline delays was not raised by the participants within the focus groups. The reason(s) for this are unclear. One possibility is methodological—the way in which the question was asked in the present tense may have led respondents to focus on the current facilitator and barriers to adoption. Alternatively, it may be that this was genuinely not a problem for our respondents or one that featured less significantly than the other barriers mentioned.

The use of PPE represented a challenge not only to dental practitioners but also for the entire population, as well as patients in care and health care settings. Dental practitioners reported that for children from Colombia and the United States, the PPE is seen as "costumes," and people wearing them "look like astronauts," as reported by the participants. The authors know of no other published empirical studies that have explored this issue either in dentistry or in other health care disciplines, and it would be interesting to understand whether this impact was more general than simply in the dental setting.

For all aspects of clinical decision-making in dentistry, the clinician is encouraged to weigh the empirical evidence, alongside the views of the patient, as well as the clinician's own preferences and experience. To a certain extent, this process appears to have taken place during the adoption of the COVID-19 PPE guidance, but a fourth variable appears to have been incorporated—namely, consideration of the impact of any change in the business of dentistry. Further research should explore the role that business-based decisions can override the 3 core decisional influences of evidence-based practice: empirical evidence, patient preference, and clinician preference. Furthermore, it is possible that policymakers and funders of services could use specific business models to encourage the adoption of the best clinical practice guidelines.

Author Contributions

E.O. Beltrán, J.T. Newton, S. Martignon, contributed to conception and design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript; V. Avila, contributed to conception and data acquisition, drafted and critically revised the manuscript; N.B. Pitts, J.E. Castellanos, L.M.A. Tenuta, contributed to data conception, critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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