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# Dental safety net providers' experiences with service delivery during the first year of COVID-19 should inform dental pandemic preparedness

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## ABSTRACT

**Background.** COVID-19 disrupted oral health care delivery and revealed gaps in dental public health emergency preparedness and response (PHEPR). Emerging dental PHEPR frameworks can be strengthened by means of understanding the experiences of the discipline's frontline workers—dental safety net providers—during the initial phase of the COVID-19 pandemic.

**Methods.** Experienced qualitative researchers interviewed dental safety net directors and clinicians (n = 21) in 6 states to understand their experiences delivering care from March 2020 through February 2021. Interview transcriptions were analyzed using iterative codes to identify major and minor themes. Conventional qualitative validity checks were used continuously to ensure impartiality and rigor.

**Results.** Three major themes were identified: unpredictability caused concerns among staff members and patients, while also deepening fulfilling collaborations; care delivery was guided by means of various resources that balanced safety, flexibility, and respect for autonomy; and pandemic-driven changes to oral health care delivery are timely, long-lasting, and can be somewhat fraught.

**Conclusions.** The human, material, and policy resources that providers used to control infections, serve vulnerable patients, maintain clinic solvency, and address provider burnout during the first year of the COVID-19 pandemic can improve dental PHEPR.

**Practical Implications.** Dental PHEPR should address concerns beyond infection control within and between practice models, governmental agencies, and professional organizations. Examples of such concerns include, but are not limited to, guideline synchronization, materials exigencies, task shifting, and provider resilience.

**Key Words.** COVID-19; dental pandemic preparedness; dental safety net; federally qualified health centers; public health emergency preparedness and response; infection control; provider resilience; qualitative methods.

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The COVID-19 pandemic affected the provision of oral health care in 2020 and 2021 substantially. In-person dental patient visits decreased due to temporary office shutdowns, reopening limitations, layoffs, insurance losses, and infection transmission fears, which subsequently led to practice revenue declines and the worsening of patients' oral conditions.<sup>1-3</sup> Dental care providers experienced psychosocial issues and burnout, in particular fear about how to protect themselves and their loved ones against transmission from air- and droplet-borne severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>4-7</sup> Oral health care delivery concerns were particularly fraught in the first year of the COVID-19 pandemic, amidst uncertainty about the microbiology of the novel pathogen; the epidemiology of infection, severity, and mortality; and effective prevention and mitigation measures.<sup>8,9</sup> Although emerging evidence indicates the effectiveness of dental infection control measures,<sup>10-12</sup> questions remain about future pathogen

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mitigation, the role of vaccinations in return to care, the appropriate use and reimbursement of teledentistry, and oral health care provider resilience, all of which can also be affected by means of ongoing changes in federal, state, and local guidelines.

The introduction of SARS-CoV-2 into human society was a watershed moment that will change oral health care in the United States and worldwide.<sup>13-17</sup> Specifically, the COVID-19 pandemic illuminates the need to bolster emergency preparedness efforts in dentistry. Public health emergency preparedness and response (PHEPR) is a domain that synthesizes recommended practices for preventing, mitigating, encapsulating, and recovering from numerous threats, including infectious disease, natural disasters, and mass violence.<sup>18</sup> PHEPR in the United States was strengthened and broadened in the early 2000s after the terrorist attacks on September 11, 2001, and is led by the Office of the Assistant Secretary for Preparedness and Response in the US Department of Health and Human Services. It comprises 15 capabilities across numerous scientific, social, and managerial considerations, such as crisis and emergency risk communication, materials management, and community engagement.<sup>19</sup> Multidisciplinary health care professions, such as emergency medicine and behavioral health, have been foundational in the history and development of PHEPR. The COVID-19 pandemic experience has broadened the recognized PHEPR workforce to include more disciplines and provider types, such as nursing and public health workers.<sup>20,21</sup> Although dentistry's leadership in pathogen mitigation since early encounters with HIV and AIDS in the 1980s has largely informed its infection control ever since,<sup>22-24</sup> the oral health care field has been largely siloed away from PHEPR efforts.

Dental PHEPR is emerging in response to the COVID-19 pandemic. Newly proposed frameworks draw on the biological, communications, and systems sciences to situate infection control in the contexts of sharing information<sup>25</sup> and standardizing protocols and materials.<sup>26</sup> Experts also advocate translating dental care professionals' skills in leadership, data management, and patient care to strengthen extradisciplinary PHEPR.<sup>14,27-30</sup> Yet, emerging dental PHEPR frameworks overlook key sociocultural, health service delivery, and policy considerations common to broader PHEPR scholarship and practice.<sup>13,15-17</sup> Our research responds to this gap by means of examining these key concepts in the context of dental PHEPR during the COVID-19 pandemic response.

In our study, we documented dental safety net (DSN) providers' experiences delivering oral health care at federally qualified health centers (FQHCs) from March 2020 through February 2021. DSNs generally and FQHCs specifically are important sites for studying PHEPR for at least 4 reasons. On the basis of social positioning and comorbidities, the more than 5 million patients served at FQHCs and millions more served at other DSN settings (for example, university clinics and Medicaid appointments in private practices) have disproportionately borne COVID-19 infections and severe symptoms, as well as unmet oral health care needs resulting from pandemic-driven care delays. The premise of FQHCs and other DSN clinics makes them sensitive to both societal shocks, such as large volumes of newly eligible patients,<sup>31</sup> and novel opportunities, such as access to targeted funding. FQHCs' organizational and often physical proximity to primary medical care clinics positions them among dentistry's most frontline service delivery categories. Finally, FQHCs' and other DSN clinics' governance and market share make them important incubators of novel health service delivery mechanisms that often subsequently scale through the private sector.<sup>32,33</sup> We gleaned FQHC providers' perspectives both for their own merit and for their contribution to a more general dental PHEPR framework.

## ABBREVIATION KEY

<b>DSN:</b>	Dental safety net.
<b>FQHC:</b>	Federally qualified health center.
<b>FTE:</b>	Full-time equivalent.
<b>PHEPR:</b>	Public health emergency preparedness and response.
<b>PPE:</b>	Personal protective equipment.
<b>SARS-CoV-2:</b>	Severe acute respiratory syndrome coronavirus 2.

## METHODS

### Study design

Our study design followed the pragmatic paradigm of qualitative health services research.<sup>34,35</sup> We conducted interviews with DSN providers from 6 states (n = 21) to understand their experiences, observations, and reflections on oral health care delivery during the first year of the COVID-19 pandemic (March 2020-February 2021). Our research was conducted in partnership with Health Choice Network (HCN), a collaborative of 43 FQHCs in 16 states that serves 2.6 million patients. Following community-engaged research best practices, our research team, including a member of HCN's Community Engagement core (K.C.-B.), made

**Table 1.** Characteristics of study participants (n = 21) and their clinics (n = 15).

CHARACTERISTIC	DATA
<b>Participant's Highest Professional Role (n = 21), No.</b>	
Clinical leader*	14
Dentist	4
Executive	2
Unknown	1
<b>Clinics in State (n = 15), No.</b>	
Florida	9
Hawaii	1
Kansas	1
Missouri	1
North Carolina	1
Rhode Island	1
Texas	1
<b>Clinics, According to No. of Dental Sites Pre-COVID-19 (n = 15), No.</b>	
1	3
2-5	5
≥ 6	2
Unknown	5
<b>No. of Patients Served by Clinics, Pre-COVID-19 (n = 15), Median (Range)</b>	27,739 (5,700-84,138)
<b>No. of Full-Time Equivalent Dentists Employed by Clinics Pre-COVID-19, Mean (Range)</b>	5.85 (1.17-11.56)
<b>Clinic Limitations Due to COVID-19, No.</b>	
Complete shut down for more than 45 d from February 2020 through April 2020	5
Services limited to emergency care in March and April 2020	10
<b>No. of Clinics Using Teledentistry Before COVID-19</b>	4

\* Includes dental director, associate dental director, oral health program director, chief dental officer, and chief dentist.

collective decisions on study design and implementation, including developing the study aims, sampling plan, and study materials; interpreting results; disseminating findings; and ensuring validity throughout the process.

### Sampling strategy and sample

We used targeted sampling to maximize variation by means of identifying 15 clinics for recruitment on the basis of features including region (West, Midwest, Mid-Atlantic, South, and Northeast), size (number of dental sites and full-time equivalent [FTE] dentists), and timing of COVID-19 closures and reopenings. We identified potential participants on the basis of role (that is, clinical director, dentist, executive, or unknown) and provided them with a study information sheet to help guide enrollment decisions (n = 21). Participants did not receive a research incentive, as participation fell within the purview of their responsibilities; their clinics received an incentive (\$1,000) to cover their time.

### Ethical issues

Our study received a status of exempt from the Western Institutional Review Board and Copernicus Group (study protocol DQPHCN01).

### Data collection and processing

Two authors (S.E.R., V.K.D.) experienced in qualitative methods conducted digital semistructured interviews with participants via Zoom from January 26, 2021, through February 26, 2021. Before

**Table 2.** Quotations illustrating themes and subthemes.

THEME/SUBTHEME	QUOTATION
<b>Unpredictability Caused Concerns Among Staff and Patients, While Also Deepening Fulfilling Collaboration</b>	
Concern: safety	"Everything in dentistry is a risk... I've always said, from day 1, (pre-appointment COVID-19 screening) results, yes, a little security, but they're as good as when you take the test. Period. Because as soon as you leave, you are taking the test, you never know if you got exposed or not... Just go back to when we first encountered HIV. You treat everyone as if they're infectious. That's just how we had to do everything." (participant 3)
Concern: professional responsibility	"Early on, for people who leave their home and come out, you know they're really hurting, so we had to do something for them." (participant 12)
	"How many times are you going to give a patient antibiotics? At some point, you just have to get in there and do it... If it was a (routine) extraction, (I) hop(ed) and pray(ed) it didn't become a surgical because I just did not want to pick up the handpiece" (participant 3).
Concern: revenue	"Everybody was going to be furloughed. That was a scary moment for me because this is my family. You leave your family at home to come to your family at work." (participant 18)
	"We've gained some new patients... They now qualify for a sliding fee scale because they don't have a job anymore, which is unfortunate for them, but then they're able to qualify for a discount... to take advantage of that and actually get some treatment done." (participant 1)
Collaboration: within team	"Very quickly, our organization developed a strong employee health system. If an employee felt sick, we all knew what to do. Employee has symptoms? Don't come in. Contact your supervisor. Contact employee health. We were lucky to have the rapid COVID testing... And have (employees who tested positive) stay home for a couple of weeks and be able to pay them.... Then certainly, if there was a known positive who was in the clinic and possibly had exposed other people or patients, our chief medical officer and employee health nurse would handle that and do tracking... and then testing those who maybe did come into contact." (participant 6)
Collaboration: within dentistry	"We stayed open 5 days a week. We kept pretty regular hours during that time on purpose. I reached out to the urgent care facility, the emergency rooms, all the local physicians' rooms, everybody at the local dentists saying that we were here for emergencies, that we do have PPE,* and that they could use us as a resource to send patients to us just for that emergency care. Then if they were with somebody else, we would send them back for the routine care." (participant 10)
Collaboration: with community	"Gowns were one of the hardest things to get ahold of. A women's leaders' group here... received some sewing machines to make masks for the community. We ask(ed) them if they could make us reusable gowns. They, of course, were very happy to oblige and we paid them a pretty fair price for the gowns. We figured we'd rather keep the money in (our community)... They sold us about 120 gowns using material that we found that was [American Society of Testing and Materials] level 2 material, which was great. They got it in all colorful colors and everything else to make it feel a little bit more fun for people coming into the clinic, not as scary when we're dressed up." (participant 10)
<b>Service Delivery Was Guided by Means of Various Resources That Balanced Safety, Flexibility, and Respect for Autonomy</b>	
Policy resources	"I did my best to try to keep up with all the guidelines... I was trying to get [American Academy of Pediatric Dentistry], [American Public Health Association], [American Dental Association], [state] Department of Health. Everything... some of them (were) based on the same thing but some of them were different, and some of them, they were very vague. At some point, I think I just said, "These are guidelines, not mandates, so I'm going to try to formulate our own version that will protect the staff, protect patients, everyone within the scope of the guidelines... We actually made our own version of protocol for donning and doffing based on the [Centers for Disease Control and Prevention] guidelines and also [Occupational Safety and Health Administration] guidelines... (The C-suite) did recommend that we focus on [Occupational Safety and Health Administration] (guidelines) being that some of our staff are unionized." (participant 2)

\* PPE: Personal protective equipment.

Table 2. Continued

THEME/SUBTHEME	QUOTATION
Material resources	<p>“We were able to retrofit. Most of our operatories are open bay, but we had 2 closed operatories, 1 of which is the hygiene room. Then the other closed operatoriy we were able to retrofit as a negative pressure room...”</p> <p>“We did have N95 masks from these kits that we had gotten a number of years before for being a center in case of a terrorist attack or anthrax. We had gowns, but that’s all the N95 masks we had... We had to use those N95 masks for a while until we were finally able to get our hands on some new ones. Of course, we did put a surgical mask over the N95 mask. Then, of course, we reused the surgical masks, but even those were running low... We had the shield, we had the head covering and we changed our under scrubs at work and kept them separate. We laundered them separately, just all of these nuts-and-bolts things that you had to start to consider about working in a pandemic. We ordered equipment that some of it we used and some of it we ended up not using...”</p> <p>“I didn’t particularly like the gowns (we) had. They feel like they’re made out of vinyl. I was just sweating like a pig.... This is another stress. Especially during the summer when we would put on 2 masks, the safety glasses, the facials, and then our safety glasses are fogged out. I’d have to take the facials off and the safety glasses off and blow air on them and then they would fog up again... That was very stressful.” (participant 8)</p>
Human resources	<p>“Asynchronous telehealth was a way for me to also utilize a hygienist. Our hygienists were basically put out of their jobs. Their procedures are all aerosol procedures; we weren’t doing them... In addition to that, a lot of our dental team was working on the COVID-19 testing efforts, which started in April, May... It was just, what could we do to keep everybody employed.” (participant 6)</p>
<b>Pandemic-Driven Changes to Comprehensive Health Service Delivery Are Timely, Long-Lasting, and Somewhat Fraught</b>	<p>“There were significant call-offs ... particularly the medical assistants, the dental assistants, the front desk operations. Why? A lot of them are single parents. Schools were closed, no childcare. And, if there’s childcare, it’s so expensive. The least resistance is just to call off. But calling off also put pressure on those (employees) that were coming in and then soon they’ll fall into the same scheme.” (provider 11)</p>
	Infection control
Teledentistry	<p>“When I hear a patient say, ‘Well, they just called me and just talked,’ [laughs] We want there to be better messaging, and I think just start to educate the patient... There were times on several occasions where we did more like a managed care or team-based care. Where if we got that 1 patient on video, I was there or my dentist, but usually it was me there, our [chief medical officer] there for medical, and our behavioral health therapist was there. The patients loved that team-based approach.” (participant 9)</p> <p>“When we were quite limited, there were patients that were interested in doing the teledentistry service, but now there’s less interest in it because the patients are physically able to come in” (participant 13).</p>
Preventive, minimally invasive, and medically integrative dentistry	<p>We (have to) prioritize sealant placement when (patients) come in for cleaning. Just not dismiss the patient, saying to the parents or patients, “Okay. You have no cavities; you can just come back for sealants.”... The pandemic hit, so they didn’t come back until now and all those molars now have cavities. If we were prioritizing the sealants back then, then those molars will be protected, and we wouldn’t actually see those cavities on those teeth. That was something that we started doing a little more and also the silver diamine fluoride application. We started having all the hygienists apply as well, not just the dentist. Also, we actually do 3 months recalls as opposed to just our 6 months recall. I really do think that dentistry will really have to, and I think it will inevitably, turn the focus a little more to prevention... It has to be a continuum of care, where it’s not just a drill and fill. Clean it, yes, but it’s also the patient education, like self-management goals, sealants, [silver diamine fluoride], whatever that you can do to prevent in case anything unexpected like this happens in this world. (participant 2)</p>

**Table 2.** Continued

THEME/SUBTHEME	QUOTATION
	<p>“Something else was positive that came out of it, and that were our patients that had not received medical services that would come into oral health and they’re diabetic patients and we were able to do—Again, they’re not going everywhere. They will tell us, “No I’m afraid to go to that big facility.” But we were able to do their hemoglobin A1Cs there, on-site, in a dental practice, which they did not have to travel to another site. Because of the electronic medical record and the dental record and we can see both, we were able to help manage that medical-dental integration.” (participant 9)</p>
<p>Acknowledging emotional experience</p>	<p>“At first, I was very worried when this first happened because I’m pretty much midway through my career and I thought, ‘Oh my gosh, how are we going to move forward?’ Honestly, the protocols have become more second nature now, the added protocols. They are more fatiguing, I have to say. I have staff that expresses wearing all the extra equipment, most of us are wearing the face shield, double masking, the gowns, and just the carefulness, the added carefulness, and attention to detail that needs to be utilized, is mentally and physically fatiguing. I’ve heard some people say that they want to get out of dentistry at this point, but I think most people are in it to try to keep moving forward. It is reassuring that we’ve been able to move forward and are 9 months in, 10 months into trying to get back to some normalcy.” (participant 16)</p>
	<p>“The impact that the COVID-19 pandemic has had on our clinic has been mostly from an anxiety standpoint. I always reassure and I instill confidence in my staff and my associate dentist that we cannot forget the way we were trained. I strongly believe that, as dentists, we were the most prepared (of all the health professions). We were the most skilled and trained in handling any kind of pandemic because we have for decades... I was a freshman dental student in 1981, when it became mandatory to use gloves because of the AIDS epidemic... I always reassure my staff that, as a dentist, when I started dental school, and every dentist since then, since the ‘80s are very well trained in infection control and all the PPEs that we use.... Me and my associate? We’re cool, we’re calm, we fix, we keep things in perspective. It was not a big deal. With my staff, because some of the ladies have children at home and they were concerned with that. I keep reassuring them: ‘Listen, let’s put on our PPEs, let’s do the right thing, let’s wash our hands frequently for 20 seconds at least’ and I made them do that. We changed gowns. We do what we got to do.” (participant 12)</p>

each interview began, we confirmed that the participant had reviewed the study information sheet, invited them to ask any questions about the study, and requested and obtained their oral consent to participate. We used an original 10-question interview guide that was developed and approved by our full study team. Questions elicited participant perspectives on care provision during the first year of the pandemic, changing knowledge at different phases of the pandemic, and care delivery barriers, challenges, and facilitators. All interviews were conducted in English. Each interview lasted from 30 through 45 minutes. Interviews were digitally recorded via Zoom and a third party transcribed the interviews. Data were anonymized by means of assigning unique identification numbers to each recording and transcript and were stored in CareQuest Institute for Oral Health’s secure server folder.

### Data analysis and validation

We completed a thematic analysis of the interview data. Interviewers memoed notes on emerging concepts throughout data collection. Once all data had been collected and transcribed, we independently reviewed all transcripts and memos and developed initial codes and subcodes by means of synthesizing deductive concepts from classic frameworks of health care delivery and implementation science<sup>36,37</sup> and inductive concepts identified from transcripts and memos. We also memoed throughout analysis to strengthen theme and subtheme development and methodological validation. Next, 2 research team members (S.E.R., V.K.D.) independently hand coded a subsample of transcripts (n = 5) using initial codes and subcodes, then reconciled differences to reflect knowledge gained during initial coding and began identifying themes. After a review period of initial themes and subthemes by our full team and key partners at HCN and CareQuest, we completed final hand coding of all remaining transcripts, then merged independently coded data to confirm saturation in the identification of themes and subthemes. We assured validity using best practices in qualitative



research, including independent coding and comparison; memoing to bracket off interpretation; full-team and partner review of initial coding and findings; member checking with participants as both an interview technique and during initial reporting to stakeholders; and transparency and self-reflection at each stage of the research process.

### Article preparation

We prepared this article according to the Standards for Reporting Qualitative Research.<sup>38</sup>

## RESULTS

Twenty-one providers from 15 FQHCs in 7 states participated in our study. Clinics ranged in size from a single site in which 4.67 FTE dental team members serve 5,700 patients to a multisite clinic in which 101.64 FTE dental team members serve 84,138 patients. Participant characteristics are presented in [Table 1](#). We identified the following 3 major themes: unpredictability caused concerns and fostered collaboration, service delivery reflected diverse resources and balancing safety with autonomy, and pandemic-driven changes to dentistry elicit ambiguity from providers but will be permanent. [Table 2](#) presents quotations that exemplify each theme through common sentiments or uniquely important insights. Additional quotational evidence is available in the JADA+ COVID-19 monograph.<sup>39</sup>

### Unpredictability caused concerns among staff members and patients, while also deepening fulfilling collaboration

Participants experienced fear, concern, and distress during the first year of COVID-19, particularly regarding the pandemic's unpredictability. A foremost concern was safety and infection control among staff members and patients. Many providers expressed frustration with delays in public and professional guidance, given dentistry's excess exposures to air- or droplet-borne pathogens. All participants framed their infection control concerns through their patient populations' disproportionate vulnerability to the clinical and psychosocial effects of both COVID-19 and delayed oral health care.

Participants' safety concerns were balanced with their sense of responsibility to patient care. Providers lamented that COVID-19–related delays in preventive services and treatments could prolong their patients' pain, worsen extant disease, delay or disincentivize treatment completion, result in otherwise avoidable invasive procedures, or leave patients “for an extended time in an interim state” (participant 13). These concerns drove clinics' resumption of nonemergency procedures in summer 2020, even when COVID-19 rates in some states remained “really, really high” (participant 3). Sequencing patient returns also proved challenging, as clinics balanced backlogs of patients who were overdue for routine or preventive services with patients who had newly urgent needs, such as disease progression due to delayed care.

Revenue loss posed another concern for providers, especially before authorization of the Coronavirus Aid, Relief, and Economic Security (CARES) Act<sup>40</sup> and the introduction of teledentistry and its “foggy” (participant 9) reimbursement guidance. Although all clinics experienced financial concerns early in the pandemic, some found novel ways to recoup revenue, such as delivering testing services or enrolling newly eligible patients. For a few providers, the long-term financial impacts of consolidating multiple dental sites into 1 physical location were not yet known. Nearly all participants expressed gratitude that clinic executives explicitly prioritized safety over revenue and trusted health care directors to determine the balance between infection control and productivity, especially during supply shortages.

Providers collaborated with peers, patients, and community members to strengthen and sustain care delivery and support one another during the first year of COVID-19. Some initiated or joined online groups with dental colleagues to crowdsource resources, troubleshoot challenges, distribute volumes of reading, and mourn, laugh, and connect. Providers who continuously delivered emergency services temporarily absorbed new patients to accommodate other clinics that had closed. Participants worked with families to troubleshoot attendance impediments, such as waiting area limitations. Above and beyond the practical effects of problem solving, these connections fulfilled and motivated them through a scary and challenging time.



### **Service delivery was guided by various resources that balanced safety, flexibility, and respect for autonomy**

Participants drew on extensive policy, material, and human resources to guide service delivery transitions. They also prioritized safety, flexibility, and respect for patient and provider autonomy. Foremost was infection control policy guidance from federal and state agencies, professional associations, and their own organizations. Although providers understood why guidance took time to develop, many also expressed frustration with the volume of guidance, how that guidance changed over time in response to emerging knowledge and, conflicts among guidelines. Clinics' adoption of teledentistry often outpaced policy guidance, including reimbursement guidelines, resulting in "weekends where I was just trying to get information, talking to colleagues, reading" (participant 3) to develop protocols and workflows.

Participants also described financial and material resources that influenced service delivery, including grants and loans, personal protective equipment (PPE), physical renovations, and, eventually, COVID-19 vaccinations. Experiences with PPE acquisition and use varied from clinics whose "forward thinking" (participant 6) administrators acquired respirator masks, extraoral suction machines, and dedicated laundry equipment before supply chains became delayed to a few providers whose clinics remained closed once mandatory restrictions lifted owing to inconsistent PPE pipelines. Universally, research participants reported feeling relief, gratitude, and "a little sense of security" (participant 3) when FQHC staff were authorized to receive vaccinations, while also responding with "courtesy" (participant 12) to staff members and patients who were concerned about the vaccines' newness, safety, and effectiveness.

Participants carefully addressed human resources with regard to infection control, service continuities, and financial solvency. All clinics reallocated staff members to some degree, and a few clinics furloughed staff for more than 2 weeks. Participants used block scheduling as an infection control strategy, at times centralizing staff members from multiple locations. Temporary task shifting and cross-training, including reassignment to the medical side, were common and posed new challenges. Other challenges included maintaining adequate coverage as staff members—in particular, dental assistants, front-desk staff, and dental hygienists—were continuously burdened by external pressures, in particular childcare coverage. Providers took pride in their executives' decisions to prioritize employment continuity, for example, applying for federal Payment Protection Program loans to maintain full salaries while implementing part-time block schedules for infection control.

### **Pandemic-driven changes to comprehensive health care delivery are timely, long-lasting, and somewhat fraught**

Participants anticipated that COVID-19 will permanently change oral health care delivery. Some changes reflect broader trends they considered burdensome but inevitable, such as strengthening infection control and telehealth. Other changes reflect emergent directions in oral health care, for example prioritizing preventive dentistry, as well as in health care in general, such as, addressing provider burnout.

Providers predicted permanent updates to universal precautions, incorporating less obtrusive PPE, such as level 3 masks, air purification, and patient scheduling and flows that reduce interactions. These measures offer patients assurance above and beyond conventional infection control. Participants also anticipated that lessons learned about the negative health effects of foregoing care during pandemic-necessitated service restrictions will lead to the use of preventive, minimally invasive, and medically integrative dentistry in the future. In particular, participants noted the routine delivery of sealants, silver diamine fluoride, and primary care screenings in the DSN as potential areas of expansion.

All participants anticipated teledentistry becoming more common to reduce in-person transmission risks, although their opinions on teledentistry varied. Some providers are "determined" (participant 11) to use it for screening and patient education or willing to learn about "ways in which we're not utilizing it" (participant 8). Others are concerned that telehealth could deepen inequities due to digital divides among patients and clinics. A few self-described "old-school" dentists (participant 14) eschew its limitations, although most agreed that reimbursement and staffing policies must be strengthened. Participants also reported varying patient responses to teledentistry, from growing uptake to sustained reluctance.

Finally, providers shared their conflicting emotions during the first year of the COVID-19 pandemic. Many participants expressed that reflecting on these emotions was a welcome and hopefully permanent change from the profession's norm of stoicism. They also observed that such reflection is essential for recovering from the pandemic's trauma and is invaluable for sustaining a resilient workforce. The pandemic's overwhelming emotional weight and professional and personal burdens led some providers to consider leaving their particular positions or the dental field entirely. Others felt gratified by their leadership growth that was demanded because of COVID-19, even when they felt scared or unsure. Ultimately, providers expect that dental pandemic preparedness will be a major topic in the future of their careers, the DSN, and the profession more broadly.

## DISCUSSION

Our study is one of the first studies on oral health care providers' self-described experiences delivering care during the emergent phase of the COVID-19 pandemic and one of the first studies to contribute empirical insights to inform dental PHEPR. It is also, to our knowledge, the first study focused specifically on DSN providers' pandemic experiences. Providers' narratives reflect the paradoxes of serving patients, leading teams, and collaborating within and outside the discipline during a prolonged emergency characterized by changing knowledge, shifting contingencies, and competing priorities. Our results elaborate the developing literature on oral health care delivery during the pandemic. These findings should be considered when developing dental PHEPR frameworks and guidelines.

Participants' concerns about infection control among patients, staff members, and personal contacts were unsurprising, given the characteristics of the SARS-CoV-2 pathogen, the centrality of infection control in dentistry, and emerging dental PHEPR.<sup>12,25,26,41,42</sup> Although participants felt confident about controlling blood-borne pathogens, their excess stress related to the novel risks of a highly infectious air- and droplet-borne pathogen in the dental space was exacerbated by 2 systems-level and 1 patient-level concerns; that is, differences in guidance from governmental and professional bodies, the unpredictability of material resource pipelines (in particular PPE), and the urgency participants felt to return patients to in-person care to manage, halt, or prevent disease.

Relatedly, our study results revealed how changing and often contradictory COVID-19 federal guidelines, also identified by other scholars,<sup>26</sup> often burdened oral health care providers, as did divergent recommendations from state public health agencies and trusted professional associations, including the American Dental Association, American Association of Public Health Dentistry, and American Public Health Association. Our study results also elucidated the limitations of dental preparedness frameworks that assume adequate and dependable material resources (for example, Benzi<sup>26</sup>) or do not account for these resources (for example, Brondani and Donnelly<sup>25</sup>). By contrast, our participants described using substandard PPE, reusing limited PPE beyond its recommended life, or delaying patients' needed care owing to unobtainable supplies. Future dental PHEPR should address both best practices in optimal infection control materials distribution at scale and essential service delivery amidst material resource limitations.<sup>43-45</sup> In addition, participants' recognition that preventive dentistry may avert disease progression in advance of mandatory service limitations indicates understanding dental PHEPR as a spectrum that leverages routine and preventable care delivery, supplies, and staffing to forestall avoidable catastrophes resulting from delaying needed care.

Our study also elaborates existing evidence on the psychosocial toll of the pandemic on oral health care providers.<sup>4-7</sup> Participants were fearful of transmission among staff members and patients, exhausted from working long hours and decision fatigue, anxious from staving off financial insolvency or staff furloughs, frustrated from irreconcilable guidance, and guilty about patients' needless pain and invasive procedures due to delayed care. Many participants also elaborated on the positive emotional outcomes of their pandemic experience, including professional growth and personal reward, as their staff members reported confidence in infection control, comfort from the vaccine, and empowerment as collaborators. As oral health care apparatuses integrate pandemic preparation and response,<sup>13-17</sup> provider resilience that draws on strengths, assets, and sense of purpose aptly complements important interventions to address burnout and other psychosocial concerns.

Finally, our findings indicate that one of COVID-19's watershed opportunities involves changing the profession's history of isolation—from other health care professions, from other dental care providers, and even (to some degree) from patients—on the basis of its consumerist model of care.<sup>46</sup> As observed elsewhere,<sup>13,25</sup> participants depended on collaboration to troubleshoot safe service

delivery and engender trust with internal, public-sector, and private-sector partners that facilitated revenue maintenance and multidisciplinary health care delivery. Indeed, our findings support experts' calls to finally normalize medical-dental integration and preventive dentistry<sup>13-16,47,48</sup> and formalize dental care professionals' broader roles during public health emergencies, including infection control leadership, epidemiologic surveillance management, and common clinical duties, such as vaccination delivery.<sup>27-30</sup> Although the DSN's frontline status indicates the salience of these findings for that subsector, applications to dental private practice as part of dental PHEPR should also be considered.

Our findings indicate opportunities for future research on dental PHEPR in the DSN and potentially beyond. Foremost, scholars should document longitudinal trends in oral health care providers' preparedness for future emergencies using both objective measures and self-reports. Studies should support the development of clear and synchronized PHEPR policies and their translation into practices beyond infection control. For example, PHEPR policies should be developed with regard to financial and material resources, including PPE pipelines and reimbursement; appropriate health care delivery models during emergencies, including teledentistry, team-based care, and temporary scope of practice changes; and workforce preparation, resilience, and retention, including training models and extra employment pressures, such as childcare needs. Dental-sector stakeholders should also strengthen emergency time working relationships between private practice oral health care providers and DSN providers, the latter of whom comprise approximately 2% of the dental workforce yet have unique frontline opportunities to serve broader patient populations during public health emergencies.

Our study had a few important limitations. Foremost, the small sample reflects providers working in FQHCs in a few states, with an oversampling of clinics in Florida due to HCN membership distribution. Participants' decision to enroll in the study may reflect strong opinions—favorable or unfavorable—about their clinic's pandemic response, their state's pandemic management guidelines, or their intent to remain in their roles. Most participants completed interviews from their workplace offices, which may have resulted in self-censorship. Data were collected before population-level vaccination efforts, vaccine mandates among health care workers, the relaxing of mask mandates in health care settings or among vaccinated people, and the proliferation of SARS-CoV-2 variants, limiting research attention to these topics.

## CONCLUSIONS

DSN providers used professional, interpersonal, material, and policy resources to control infections, deliver services to vulnerable patients, maintain clinic solvency, and address provider burnout during the first year of the COVID-19 pandemic. Dental pandemic preparedness should address factors beyond infection control, such as policy synchronization, pipelines for materials, business financial relief, reimbursement, and provider resilience. ■

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