Twitter communication of the UK public on dental health and care during a COVID lockdown: "My kingdom for a dentist"

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Background: The COVID-19 pandemic forced a UK-wide closure of dental services. An understanding of public concerns about dental care was urgently needed to inform careful resumption of paused dental services. **Aim**: To describe public concerns about dental care during lockdown. **Basic research design**: Framework analysis of relevant Twitter posts identified collected using the Awario tool. **Results**: Of 1863 tweets manually screened for eligibility, 285 were relevant, as they contained views expressed by the public. The number of tweets by country were proportionate to the population size. The key views expressed in tweets focused on: 'oral health impact' ('oral health and self-care', 'types of dental problems', 'managing symptoms at home', 'views on consequences of delaying treatment') and 'dental service or care provision' ('views on managing dental care response', 'experiences with access to dental care'). **Conclusions**: The impact of COVID-19 on dental services raised many physical and mental health concerns for the public, highlighting their importance. Online profiles and social media communication platforms can be used to provide convenient, and timely information on public perceptions of dental care.

Keywords: *Qualitative research, oral health, dental care, social media*

Introduction

Qualitative research on how and why people access emergency dental services suggests that a wide range of contextual factors influence patients' decisions about whether they need to see a dentist urgently (Anderson and Thomas, 2003; Anderson, 2004). Combined with a lack of awareness of the existence of emergency dental services, patients' pathways to care are often complicated (Anderson and Thomas, 2003). The planning of emergency dental services amid the unprecedented crisis of the Coronavirus disease-2019 (COVID-19) pandemic created even more challenges.

In response to the outbreak, the British Dental Association and UK Chief Dental Officers advised dentists to close temporarily for all but emergency cases. On 30th March, the Scottish Dental Clinical Effectiveness Programme (SDCEP, 2020a) released a guideline for dental professionals defining dental emergency treatments and care pathways during the initial stages of the COVID-19 pandemic. On 11th May, SDCEP (2020b) also published their repackaged advice on pharmacological management of dental problems during the pandemic. Three months later NHS dentistry began a careful resumption of paused dental services. In this rapidly changing environment, ensuring public perspectives were swiftly incorporated into this guidance was critical.

Analysis of social media posts can offer rapid access to public experiences and concerns about dental care and health, without the delays and burden involved in traditional research methods (Tao *et al*., 2020). A recent scoping review demonstrated that social media, including Twitter, can also play roles in disseminating health information and tackling infodemics and misinformation (Tsao *et al*., 2021), including oral health (Noll *et al*., 2017; Tao *et al*., 2020). We report the results of a social media analysis that helped to generate evidence on how to support patients and our reflections on lessons for UK dentistry going forward. The aim of our study was to inform the development of dental guidance during the COVID-19 pandemic by identifying public concerns and experiences of dental healthcare during the UK-wide COVID-19 lockdown using social media analysis.

Method

The Awario tool was used to identify relevant public communications from the Twitter platform. Awario is a social media and web monitoring tool used by businesses to track mentions of their brand online, which developed from another product by the same company (SEO Power-Suite). We used the Boolean search, reporting, dashboard and topic cloud functions of the tool.

We captured Twitter communications (tweets, re-tweets and responses to tweets), which were downloadable as exportable excel files. A Boolean search was developed by the research team, which was composed of health care service researchers, academic and dental care providers and informed by members of the public through the Public Involvement Partnership Group at the Health Services

Research Unit (HSRU). The search strategy, including a combination of keywords and hashtags related to terms 'dental care' and 'COVID-19' is presented in Box 1.

We restricted the search to the UK (defined by geographical location of a twitter user account), English language only (for practical reasons) and search time starting from 1st March 2020. We excluded tweets that were off-topic, deleted, advertisements or communications directed at the dental care community. We included communications by and between the public and clearly directed at the public (e.g., from healthcare professionals, dental or health networks, charities or news). Data of interest were perspectives and experiences on dental health and care. This publication presents the results for 'views expressed by the public' (i.e. tweets and responses of the public, and communication clearly directed at the public with responses from the public or in response to tweets posted by the public). Tweets directed at the public but without responses from the public, such as formal announcements/guidance, were regarded as beyond our scope and excluded from analysis.

An eligibility screening process was piloted independently. For the pilot, inclusion screening was performed independently by two researchers (i.e., MR-TL, MR-LL, MR-KB, with a set of 100 tweets/replies each pair). Any emergent disagreements or doubts were resolved via discussion to reach consensus, and if this was not possible, by a third researcher. Agreement of 80% or more was reached in each case and considered sufficient for one researcher (MR) to proceed to screen the remaining data.

A bespoke data extraction form included information provided by Awario search reports (including date, author name and author' username, post snippet, sentiment, reach (i.e., how many people are involved in and exposed to any conversation) and mention URL); and manually generated information (including eligibility decision, location in the UK, tweet type, sentiment, number of times retweeted and liked, and initial codes identified). The form was piloted during the eligibility screening.

UK dental practices were advised to close between 18th - 23rd March 2020. In the first wave of the pandemic, the highest number of deaths was reported on 8th April.

The UK Prime Minister announced on 11th May that dentistry was anticipated to resume from 4th July. We therefore analysed tweets from two sample periods: 20th March - 12th April and 11th - 18th May.

We report frequencies of all the tweets identified and frequencies of those that met the definition 'views expressed by the public' (analysed qualitatively). We also stratified frequencies of those tweets by the four UK nations and by day. To overview the topics discussed, we present word clouds for all included tweets (including most frequently mentioned words, hashtags, and phrases). '*Reach*' metrics generated by Awario indicated the weight each of the Twitter account holders had online.

Framework analysis of the tweets concerning 'views expressed by the public' (including text and responses) was conducted (Ritchie and Spencer, 1994). This method has been used for Twitter analysis (Richardson *et al.*, 2016). We adopted an inductive and iterative approach to analysis. The dataset was charted in an excel spreadsheet. First, one person familiarised herself (MR) with the tweets posted between 20th March and 30th March. While doing so she recorded notes of emerging issues in the data and discussed them with the team to develop an initial set of codes to be applied within the framework. Then, several team members (MR, LL, TL, KB) read each tweet in the first time period, applying initial codes (text labels that described what we interpreted). We then refined the framework of codes into overarching sub-themes. This framework was then applied to index subsequent tweets by one researcher (MR). New codes were added for data that did not fit the existing codes. During regular discussions, the managed data were mapped and interpreted by making connections between sub-themes and themes. The initial and final frameworks can be found in Appendix 1 (available at https://abdn.pure.elsevier.com/en/datasets/twitter-communication-of-the-uk-public-on-dental-health-and-care-)

Twitter constitutes naturally occurring data in what Eysenbach and Till (2001) would describe as a 'public space', in which a researcher may conduct a study without obtaining individual consent. We ensured our intended use complied with Twitter policy by submitting a Twitter

Box 1. The Boolean search strategy used to harness tweets using the Awario tool.

(#toothache OR #toothswelling OR #pulltooth OR #abscess OR #teeth OR #dentalemergency OR #dentalpain OR #emergencydentaltreatment OR #dentalcare OR #dentist OR #dentistry OR #tooth OR #mydentist OR @mydentist_uk OR #dental OR dental OR near/3:tooth,ache OR toothache OR near/3:tooth,swelling OR near/3:pull,tooth OR abscess OR tooth OR near/3:dental,emergency OR near/3:dental,pain OR teeth OR near/6:emergency,dental,treatment OR near/3:dental,care OR near/3:root,canal OR near/3:root,treatment OR near/3:gum,boil OR extraction OR
near/3:extract,tooth OR near/3:extract,teeth OR near/6:dental,nerve,pain OR
near/6:tooth,nerve,pain OR near/3:tooth,out OR near/3:chipped,tooth OR
near/3:crown,out OR near/3:crown,dislodged OR near/3:crown,broken OR
near/3:dental,cap OR near/3:dental,hygiene OR near/3:veneer,broken OR near/3:mouth,ulcer OR near/3:tongue,ulcer OR
near/3:broken,tooth OR near/3:bleeding,gum OR near/3:bleeding,tooth OR near/6:dental,bridge,out OR
near/3:dental,plate OR near/3:denture,broken OR near/3:filling,needed OR
near/3:filling,loose OR near/6:filling,dropped,out OR near/3:filling,broken OR near/3:gum,inflammation OR near/3:gum,ulcer OR near/3:loose,tooth OR
near/3:loose,teeth OR near/3:sore,gum OR near/3:tooth,infection OR near/3:tooth,repair OR near/3:tooth,sensitivity OR near/3:tooth,stain OR near/3:teeth,grinding OR near/3:grind,teeth OR near/3:jaw,clenching OR bruxism)
AND (#covid19 OR #COVID_19 OR #COVID-19 OR #coronavirus OR
#coronavirusuk OR #covid19uk OR #UKlockdown OR #stayhome OR #CoronavirusLockdownUK OR near/3:UK,lockdown OR near/3:lockdown,UK OR
near/3:stay,home OR COVID19 OR COVID_19 ORCOVID-19 OR coronavirus OR near/3:corona,virus OR COVID) **AND** lang:en **AND** country:GB **FROM** twitter

developer account application comprising a statement on pre-defined purpose and plan for data use, which was reviewed and approved by a Twitter team.

Results

A total of 1863 tweets (Period 1: 800 and Period 2: 1063) were identified by Awario, of which 285 (15%) contained 'views expressed by the public'. These tweets represented a reach of 7,406,528 Twitter accounts. The distribution across locations of account holders was: England: 74%, somewhere unspecified in the UK: 11%, Scotland: 7%, Northern Ireland: 5%, Wales: 2%, and a UK-wide group/ organisation: 1%. The frequency of tweets published is depicted in Figure 1.

Word Clouds of the tweet content with 'views expressed by the public' and exemplary tweets can be found in Appendices 2 and 3 (https://abdn.pure.elsevier.com/ en/datasets/twitter-communication-of-the-uk-public-on-dental-health-and-care-). We developed two meta-themes: 1) 'Oral Health Impact' (with four themes) and 2) 'Dental Service or Care Provision' (with two themes). Results within these themes are presented chronologically below.

Oral Health Impact

Oral health and self-care

The topic of oral self-care and COVID-19 emerged early in lockdown. In the first few weeks (March), twitters raised uncertainties about self-care ("nothing has been said about cleaning teeth and gums as thoroughly as washing your hands", one person said), care for oral health of others during the lockdown and potential oral symptoms of COVID-19. Some described how COVID-19-attributed physical weakness posed difficulties with maintaining oral self-care.

In May, oral self-care was the subject of a wider public discourse with divided opinions, focused on brushing teeth and mouthwash having "the potential to protect against #COVID19 infection" (as one person commented). Some members of the public expressed concerns that if this was proved to be correct, another 'toilet roll' situation (shortages resulting from panic buying) would emerge but this time with mouthwash.

Types of dental problems

Within days of dental practices closing, the public shared personal or family members' stories of struggling with dental problems they were unsure how to manage. Those problems included mostly odontogenic pain (e.g., 'severe toothache', 'wisdom tooth discomfort'), 'teeth grinding' and 'dental abscess'; but also 'lost fillings' and 'lost dentures'; 'tooth fracture' and 'loose crown'. People wondered if 'anyone got any idea how to get rid of toothache?' or 'what if you need a filling for your teeth?' A few weeks later, we also encountered reports of discontinued or postponed root canal treatment or extractions.

In May, reports of extreme dental pain lasting up to two months were widely shared and received nationwide
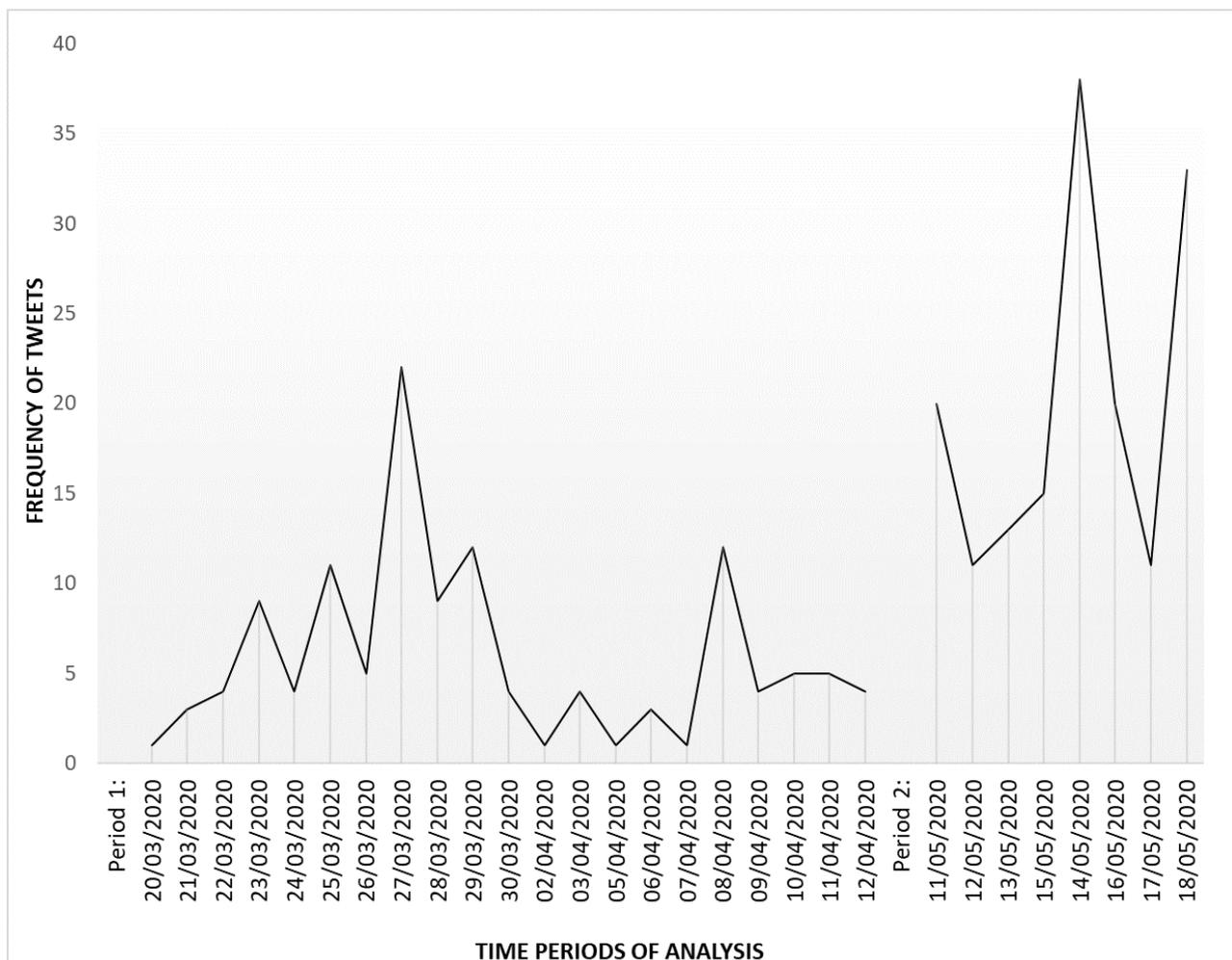

Figure 1. Frequency of tweets concerning views expressed over time by the public.

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media coverage: 'having tooth pain for nearly two months now really makes me struggle', as one person said. We also identified a worried patient's testimony of concern about being left longer than planned with a temporary filling in root canal and several reports of orthodontic problems (e.g., a child's orthodontic appliances 'coming apart'; 'braces not tightened for two months', with 'wire pushing out' and a 'broken bridge'). At this point we first encountered tweets describing fears about regular or annual dental check-ups being missed or due.

Managing symptoms at home

The use of analgesics and antibiotics was widely reported. Methods to manage dental problems at home were also discussed, including home remedies (e.g., a saltwater rinse for infections; and clove infusions and alcohol for pain; soft diet to manage broken dental crowns) and recommended conservative treatment (e.g., a mouth guard and mouth exercises for 'jaw clenching').

In early April, reports of antibiotic and oral analgesic use, some of which could be obtained through pharmacists, were reported. Some individuals described 'living on painkillers' for weeks, or two courses of antibiotics, and for some those medications no longer worked. The analgesics used included paracetamol, co-codamol, codeine, tramadol, dihydrocodeine, ibuprofen.

In regard to managing pain and swelling at home, more home remedies were reported (e.g., hot or cold towel, drinking and gargling with drinkable alcohol, sugar free chewing gum, fresh ginger, cannabidiol oil), and this time also dental products (e.g., benzocaine [Orajel, Anbesol], Bonjela, special toothpaste [Sensitive and Sensodyne rapid relief], and antiseptic mouthwash). Widespread use, even a shortage, of temporary fillings kits (available online and from pharmacists) was mentioned at that point.

By May, reports of using a combined or second course of antibiotics, or two months on analgesics, were common. 'DIY' dentistry was a widely discussed public concern, expressed through sharing and commenting on related media coverage and individual testimonies of 'popping pills quicker than a junkie this week' and 'chemists run[ning] out of emergency repair kits – it's getting painful – before taking things own hands - any idea?'. In addition to 'DIY methods' to manage pain, swelling and lost restorations discussed earlier, we identified some accounts of home interventions, including using glue to repair dental bridges, pushing back orthodontic wires and filing a broken tooth with an emery board.

Views on consequences of delaying treatment

In late March and early April, with the emerging recognition of the severity and long-lasting effects of the pandemic, fears of negative consequences of delaying treatment for dental abscesses started to be voiced, including abscess-attributed loss of weight and a fear that untreated abscesses might result in infections getting worse or even proving fatal.

In May, these concerns intensified and other negative consequences of delaying treatment emerged, including distress (such as 'dire daily agony & infection for traumatised patients in agony continues'), analgesic addiction or antibiotic resistance ('How can I keep on antibiotics? I will end up with C-diff") and overburdened dental services with anticipated longer NHS appointment waiting times (~6 months) for root canal treatment. The use of antibiotics and analgesics as treatment-delay options was regarded as insufficient. For some, dental extraction, the third available treatment option, was also unacceptable, even described with anger as 'barbaric' (for example one person said that 'offering extractions only [being] nothing short of barbaric and terrifying'). Some members of the public questioned or even seemed angered that immediate dental problems were being treated with less importance than the potential risk of COVID-19.

Dental Service or Care Provision

Views on managing dental care

Within days of practice closures, the public expressed worries and were critical of the impact of restricted dental care provision. Some used humour to imply criticism. Others expressed direct criticism, particularly of the perceived 'slowness' in preparing dental practices to address the new challenge (e.g., inadequate Personal Protective Equipment (PPE), a lack of COVID-19 testing and insufficient financial support from the government). This perception was linked to gratitude for dental professionals who were understood to be risking their health and growing appreciation for having dental care provision.

In early April, concerns over the lack of access to dental care intensified in frequency and strength, and were expressed mostly in the context of retweeted or commented-on popular media coverage of this problem. Tweets described feeling frustrated with the British government's perceived 'slow response' to providing dentistry with adequate PPE. One frustrated person asked 'living on #Ibuprofen #vulnerabale category patients, when will you supply PPE to dentists?' There was also concern that urgent dental care (UDC) units were not being set up in some UK regions, resulting in access being viewed as impossible or at least unsafe.

By May, the restricted access to dental services was no longer spoken of as an inevitable consequence of COVID-19, but rather as a public health priority. Tweets expressed anger and a need for clarification about dentistry and when dentists would re-open ('Dentistry still in lockdown. Shameful delays stop Dental practices opening'), and even a social campaign to #openthedentist started in response to an outcry of people suffering for months from dental pain. People widely described their desperation for dental practices to re-open, with one person saying, 'my kingdom for a dentist'. Concerns about the safety of dental visits due to lack of PPE were still voiced; some individuals openly called for the government to support dentistry adequately as part of front-line primary care. Worries about resumption of regular dental check-ups were also common.

Experiences with access to dental care

Early tweets expressed frustration and uncertainty about being contacted by dental practices to change or cancel appointments. The public, including those in self-declared need for dental care, were unsure how to access it and how it operated, one person asking 'Any dentist out there [..] I've tried looking on the website and can't find any

advice on #coronavirus and I can't get through on the phone'. Support was expressed through sympathy, advice and information-sharing. While many reported not being able to see a dentist, others mentioned being able to see their dentists and were generally happy with the care/ advice received (one person reporting with relief she was 'finally sorted today by specialist NHS hospital'). Those who sought access to urgent care described challenges with finding help through NHS hospitals (e.g., no-one answering a provided emergency phone number, having to call around in search of help). Not everyone who accessed dental care got the help they needed; one person who sought an emergency dental appointment was told his root canal would be done only once UDC units, with appropriate PPE, were set up.

Two weeks later, more personal testimonies were shared, some clearly suggesting people had experienced being refused NHS dental care. However, a few people with dental emergencies reported being able to see their dentists privately, and again seemed relieved and happy with the care received, one person saying, 'brilliant service today from my #dentist'.

In May, tweets continued to express uncertainties over how to access care, pointing out a lack of up-to-date information (e.g., through NHS websites) and tailored information for groups with particular needs (e.g., deaf people or children with autism). At this point, it became more apparent that the public felt that dental care access was unfair and inequitable. In terms of organisation, some private practices continued to operate, and others did not, dental hospital or UCD units were available in some locations but not others (forcing patients to travel long distances, such as a person who said 'I have been on 2 lots of antibiotics and then if they decide to take it out, I will have to travel over 30 miles (don't drive)'. Complaints were common about refusal of dental care by UDC units on account of the type of emergency (e.g., some tooth fractures or root canals not qualifying for or not treatable at UDC units). Furthermore, testimonies of additional difficulties of sub-populations were observed, such as people with COVID-19 symptoms and parents of children with autism. One parent shared their despair: 'It's frustrating everything we try or do for our kids appear to be at the back of the queue!!!! Rant over #autism #toothache #covid fallout'. Inequality and unfairness were also evident in discussion of financial aspects of experiences with dental care. Some people with new problems felt that the only true care options were unaffordable (e.g., traveling to UDC units or dental hospitals or being forced to use private care), while those with ongoing or interrupted treatment were concerned about their dental care agreements being honoured or otherwise reimbursed.

Public perspectives identified in this Twitter analysis directly informed the development of several pandemic critical dental guidelines, namely: SDCEP (2020a) acute dental management guidance, the supplement on the drug management guidance (SDCEP, 2020b) and the national multidisciplinary rapid review (SDECP, 2020c). The findings from the analysis were shared with the SDCEP guidance development team and presented at two patient forums comprising members of the public who had experienced dental problems and/or dental care during the pandemic. They informed the content of the initial documents and development of the scope agreed by the national multidisciplinary working group of the rapid review. The acute dental condition guidance informed the practical management of patients being treated during the pandemic and was viewed 105,000 times.

Discussion

This qualitative analysis of views expressed on Twitter by the public on oral health impact and dental service or care provision during a UK-wide COVID-19 lockdown was shared with the SDCEP core team and presented to patient forums and the expert multidisciplinary working group to inform guidance development and the rapid review process.

The findings demonstrate the importance attached by the UK public to oral health and support evidence suggesting that many view access to state-funded oral health care as their right (Borreani et al., 2010). The lockdown resulted not only in distress caused by dental problems, but also the right to access care was unclear or effectively denied to many. Difficulties with accessing dental service in the UK have been highlighted previously (Marshman et al., 2012) and in the context of the COVID-19 response (Healthwatch, 2020). Previously reported regional and a socioeconomic inequalities in access to dental care (Appleby et al., 2017) were exacerbated during this crisis. Given that patient experience is a critical dimension of quality of dental services (Mills et al., 2015) and perceived difficulty may be associated with poorer outcomes (Marshman et al., 2012), these are important findings. They also prompt two reflections on the role of dentistry: first, that the public became acutely aware of the importance of access to dental care, and secondly, that dentistry, often considered a separate entity from medical care, was viewed as receiving less government support than medicine. The political will to support dentistry akin to other health care services appeared to be a challenge, and within two months it became clear to the public that this was an unacceptable neglect.

The role of social media in dental services is unclear (Parmar et al., 2018), but we know that people seek health information online (Lee et al., 2015; Tennant et al., 2015). We have demonstrated that people sought online advice on dental health problems, self-care and care access for dentistry on Twitter. Importantly, over time people were still sharing their 'dental' stories and looking for that advice. It is not unreasonable to think that people will continue to search for information. The observation that 285 tweets represented a reach of 7.5m Twitter accounts emphasises the importance of consistent messaging, given how quick that reach can be. On-line profiles of dental practices and websites of health authorities should have up-to-date and reliable information available on closures, access and local alternatives, as well as advice on how to manage a range of different situations. These suggestions echo emerging evidence suggesting a need to formulate clear communication about dental care access now and after the pandemic (Community Research, 2020; Moffat et al., 2020).

Twitter has limitations as a qualitative data source. Participation in the discussion required awareness of social media and a Twitter account. Tweets are brief

condensed communications; which content we found to be often ambiguous and lacking details. Although we captured reports of satisfaction with dental care, users were unlikely to tweet about positive views and experiences. While Twitter has millions of users and massive reach, it is not necessarily representative of the whole population. We also lack a comparison with how people experienced dental care before the pandemic. There is evidence that Twitter analysis can provide useful insights (Tsao *et al*., 2021), but we did not set out to review all forms of social media, which might have yielded different results.

Qualitative analysis of Twitter posts proved useful but requires further methodological refinement. Despite the uncertainties surrounding quantitative sentiment analysis of Twitter (Puschmann and Powell, 2018), we know that it can be useful, for example, in pre-warning of how and where infections are spreading (Szomszor *et al*., 2012; Yousefinaghani *et al*., 2019) and dissemination of COVID-19–related oral health information (Tao *et al*., 2020). Descriptive statistics and word clouds were helpful as graphical depictions, but qualitative analysis was necessary to understand the narrative behind people's reactions. While many examples exist of how qualitative analysis can aid Twitter use to raise an awareness of a healthcare topic (Richardson *et al*., 2016) and crisis management (Parsons *et al*., 2015), there is less description of how to analyse tweets qualitatively.

Conclusions

Qualitative analysis of tweets enabled swift access to real-time naturally occurring data and circumvented an unnecessary research burden. Twitter communication analysis is a useful way of capturing insights into people's changing views, behaviour and reactions over time and informing guidance development for management of dental services. The COVID-19 lockdown evidently impacted oral health and dental care provision, which prompted the public to reflect on the critical role of dental health and the right (or not) to access dental care. This study highlights the importance and need for clear communication on how public and patients can look after their own oral health, how to alleviate pain and swelling safely and how to safely access care. Using online written communication platforms to provide convenient information in a timely manner for at least some people is recommendable.

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