

Survey of COVID-19 self-isolation patterns in UK dental professionals: initial findings (February – April 2020)

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Abstract

Aim: Dentistry is routinely associated with aerosol generating procedures (AGP). AGP has been suggested as a possible route for the transmission of SARS-CoV-2 and may place the dental team at increased risk of infection. In the absence of widespread testing of the dental workforce to ascertain the incidence SARS-CoV-2, a web-based self-reporting survey captured self-isolation patterns in dental professionals.

Method: A web-based closed questionnaire via the Survey Monkey platform captured reported COVID-19 self-isolation patterns in the dental team.

Results: A total of 3,309 responses were collected. 2,888 (87.3%) responses contained valid data. 26.8% of respondents reported self-isolating. Of these 31.2% did so because they were suffering from COVID-like symptoms, 21.3% in order to protect a vulnerable member of their household, 25.7% because a member of their household was suffering from COVID-19 like symptoms, and 21.8% self-isolated in to protect themselves. The patterns of self-isolation of those who self-isolated due to COVID-like symptoms differed from the other three groups.

Conclusion: Despite the inherent limitations of self-reporting surveys, a web-based self-reporting questionnaire rapidly captured self-isolating patterns in dental professionals. Those professionals who self-isolated due to COVID-like symptoms appeared to isolate earlier than those other groups. The initial findings from this survey would suggest that dental professionals have not experienced disproportionately higher levels of COVID-like symptoms.

Introduction

SARS-CoV-2 a single-stranded RNA beta coronavirus has been identified as the cause of the disease known as COVID-19. It is one of seven known transmissible coronaviruses capable of infecting humans. SARS-CoV-2 emerged in Wuhan, Hubei province, China in late November 2019 or early December 2019; the primary reservoir for the virus remains unidentified. COVID-19 was declared a pandemic by the World Health organisation on 11th March 2020. In the United Kingdom, as of 17th April, there have been 438,991 tests in 341,551 people; with 108,691 confirmed COVID-19 cases and 14,576 deaths.

COVID-19 is a communicable disease; infected individuals primarily transmitting SARS-CoV-2 via contact or by respiratory droplets. In addition aerosol and faecal-oral spread have been suggested as possible routes of transmission. Routine dentistry frequently involves aerosol generating procedures (AGP). Therefore it has been proposed that the dental team may be at increased risk of infection, and dental care itself may be a route for transmission of SARS-CoV-2 within the community. Accordingly all routine dental treatment has been suspended in the United Kingdom.

In the absence of widespread testing to ascertain the incidence of SARS-CoV-2 infection in the dental workforce, it was considered that a simple self-reporting survey could capture self-isolation patterns in the dental team. Electronic surveys are straightforward for respondents, mitigate the risk of data loss and facilitate data transfer and analysis. Web-based platforms have been used previously to capture data from health care professionals (HCP).

Methods

A web-based closed questionnaire via the Survey Monkey platform (SurveyMonkey Inc., San Mateo, California, USA, www.surveymonkey.com) captured reported COVID-19 self-isolation patterns in the dental team between 10th and 17 April 2020. The survey was openly distributed through messaging apps and dental social media channels.

A total of 3,309 responses were collected. All incomplete responses were discarded. Only responses from UK dental professionals were evaluated. The GDC number was screened and rejected where the format did not match the registrant type (however GDC numbers were not individually validated). All responses where GDC numbers were in duplicate or where the date for self-isolation predated the first confirmed UK COVID-19 case were discarded. 2,888 (87.3%) responses remained for evaluation.

Results were analysed in PSPP (GNU Project (2018). GNU PSPP for GNU/Linux (Version 1.2.0-g0fb4db) Boston, MA: Free Software Foundation, www.gnu.org/software/pspp/). At this time the analyses are solely descriptive: the current paucity of studies assessing diagnosed SARS-CoV-2 infection and reliability of self-reporting COVID-19-like symptoms prohibit further conclusions.

Results

Of the 2,888 valid responses, 0.6% (18) were clinical dental technicians (CDT), (22.9%) 661 dental

hygienists, 10.8% (313) dental nurses, 1.3% (38) dental technicians, 18.2% (526) dental therapists, 45.7% (1,321) dentists including specialists, 0.3% (8) oral and maxillofacial surgeons, and 0.1% (3) orthodontic therapists.

The mean number of days dental professionals reported treating patients prior to the current pandemic was 4.03 (SD = 1.07). On a typical pre-pandemic day, 2.1% (61) of dental professionals reported that they did not normally see any patients, 1.7% (50) typically saw between 1 and 5 patients, 11.7% (339) saw 5–10 patients, 59.7% (1,725) between 10 and 20 patients, and 24.7% (713) saw more than 20 patients each day.

Self-isolation patterns

26.8% (775) of respondents reported that they self-isolated due to COVID-19. Of these 31.2% (242) reported they did so because they were suffering from the symptoms associated with COVID-19 (COVID-like symptoms), 21.3% (165) in order to protect or shield a vulnerable member of their household, 25.7% (199) because a member of their household was suffering from COVID-like symptoms, and 21.8% (169) self-isolated in order to protect or shield themselves. See *Figure 1*.

Of those who self-isolated in this survey, 15.5% (120) did so for between 1 and 7 days, 41.9% (325) 8 to 14 days, and 42.6% (330) for 15 or more days.

The proportion of each registrant type who identified themselves as shielded or vulnerable was; CDT 16.7% (3), dental hygienist 6.2% (41), dental nurse 6.4% (20), dental technician 7.9% (3), dental therapist 7.6% (40), dentist 4.7% (62), and 0.0% of oral/maxillofacial surgeons and orthodontic therapists.

For those who reported they self-isolated further information relating to household size was gathered. For respondents who reported self-isolation for any reason mean household size was 3.15 (SD = 1.24, n = 775). For those who reported COVID-like symptoms mean household size was 3.02 (SD = 1.28, n = 242). Where the dental professional reported a household member having COVID-like symptoms mean household size was 3.52 (SD = 1.06, n = 199). For those who self-isolated to protect a vulnerable member of their household mean household size was 3.4 (SD = 1.4, n = 165). Dental professionals who self-isolated because they identified as vulnerable mean household size was 2.64

(SD = 1.03, n = 169). *Figure 2* graphically displays the 95% confidence intervals for each of these groups.

Where the dental professional self-isolated, supplementary information was gathered regarding the total number of household members who currently were, or had been suffering from COVID-19 symptoms. For all groups who self-isolated mean number of household members reporting COVID-like symptoms was 1.05 (SD = 1.17, n = 775). For dental professionals with COVID-like symptoms, the mean number of household members with COVID-like symptoms was 1.81 (SD = 1.11, n = 242).

Where the dental professional reported a household member having COVID-like symptoms, mean household members with symptoms was 1.63 (SD = 1.03, n = 199). For those who self-isolated to protect a vulnerable member of their household, the mean symptomatic household members was 0.19 (SD = 0.53, n = 165). Dental professionals who self-isolated because they identified as vulnerable, the mean symptomatic members of the household was 0.11 (SD = 0.44, n = 169). *Figure 3* graphically displays the 95% confidence intervals for each of the groups.

89.5% (299) of households which did not report any household members with COVID-like symptoms at the time of self-isolation remained free of occupants with COVID-like symptoms. 10.5% (35) of households did not.

Description of the symptoms

The proportion of each registrant type who reported they self-isolated due to COVID-like symptoms were; CDT 5.6% (1), dental hygienist 6.5% (43), dental nurse 6.7% (21), dental technician 5.3% (2), dental therapist 9.9% (52), dentist 9.1% (120), oral or maxillofacial surgeon 37.5% (3) and orthodontic therapist 0.0% (0). The symptoms reported by these dental professionals can be found in *Figure 4*.

Of the 199 respondents who reported they self-isolated because a member of their household was suffering from COVID-like symptoms, the symptoms reported were; 65.8% (131) fever, 75.9% (151) cough, 27.1% (54) shortness of breath or breathing difficulties, 14.1% (28) anosmia, 30.7% (61) muscle or joint aches, 42.2% (84) headache, and 46.2% (92) tiredness.

In the current survey, only 2.9% (7) of dental professionals who reported they self-isolated because

they were suffering from COVID-like symptoms also reported they had been tested for the disease. Of these 42.9% (3) tested positive.

8.5% (17) of dental professionals who self-isolated due to a household member suffering from COVID-like symptoms also reported that their household member had been tested for the disease. Of those household members tested, 52.9% (9) tested positive.

Dental aerosol

Of the respondents who self-isolated because they were suffering from COVID-like symptoms, 96.7% (234) considered themselves routinely exposed to dental aerosol. Of those who did not self-isolate or self-isolated for other reasons, 96.5% (2,553) considered themselves routinely exposed to dental aerosol.

Date of self-isolation

A frequency polygon displaying the incidence of self-isolation over time can be found in Figure 5. The first dental professional self-isolating in relation to COVID-19 in this survey did so on 10th February 2020. The frequency of self-isolation increases in all groups from 10th March 2020. Dental professionals who reported they self-isolated due to COVID-like symptoms did so earlier than the other groups. Peak frequency for those who reported they self-isolated due to COVID-like symptoms was on 16th March (n = 22). For all other groups, the peak frequency for self-isolation occurs seven days later. See Figure 6.

Discussion

This survey of self-isolation patterns in a sample of UK dental professionals is naturally limited by virtue of its self-reporting nature. Due to very few tests being conducted in the UK generally, this survey is unable to report on whether the dental professional was infected with SARS-CoV-2 or diagnosed with COVID-19 disease. It is appreciated that COVID-19 symptoms overlap with those of other respiratory diseases including the common cold. An unfortunate requirement of this self-reporting survey is the assumption that a significant proportion those who report COVID-like symptoms are suffering from the disease. Post pandemic analysis by other researchers will confirm or refute this.

On 17th April 2020, the Centers for Disease Control and Prevention published information relating to 9,282 healthcare professionals (HCP) with laboratory confirmed COVID-19. The publication included the signs and symptoms reported by those HCP. This data is included in *Figure 4* for comparison with the symptoms reported by respondents in this survey. Symptom characterisation not only remains subject to individual pathophysiology; it also depends on personal assessment and accordingly may be an unreliable indicator for the presence of pathology.

This survey identified that 8.4% of UK dental professionals self-isolated due to COVID-like symptoms and 6.9% because a member of their household had symptoms. These findings imply a level of disease amongst dental professionals lower than that recorded in hospital HCP in Madrid. The incidence of laboratory confirmed COVID-19 cases in hospital services, administrative, laboratory and workforce staff was found to be 11.6%. The observed levels of disease were independent of exposure risk. The authors concluded that the findings in the hospital workforce merely reflected background community exposure levels. Similar findings were observed in two Dutch hospitals where the level of SARS-CoV-2 infection amongst HCP was found to be 6%. This was also considered a reflection of disease levels in the community. In February 2020, the WHO-China joint mission concluded that the majority of COVID-19 transmissions for HCP occurred at home rather than at the workplace.

In a survey of its membership, the Royal College of Physicians reported that in the weeks leading up to the survey; 7.2% of its members reported they self-isolated due to COVID-like symptoms, and 5.3% because a member of their household was suffering from COVID-like symptoms. The current survey discovered similar reporting patterns amongst dental professionals. In comparison with members of their households, the higher levels of COVID-like symptoms in medical and dental professionals may reflect greater social contact due to the nature of their work. This however this should not be regarded a substantiated conclusion. Data relating to the nature of work of household members was not collected in the current survey, and was not available for analysis from the Royal College of Physicians survey. To provide an indication of possible background infection levels, at the time of this publication it is reported that 9.1% of the defence workforce is absent due to COVID-19. At first blush it would not appear that dental professionals are at any greater risk than overseas or UK medical

colleagues, or members of the UK armed forces.

There is a noticeable peak on 23rd March where self-isolation occurred primarily to protect a household member,. This is the day after the British Dental Association (BDA) issued urgent advice to its members, and the first working day following the Chief Dental Officer (England) advice that dentists should ‘...[r]adically reduce the number of routine check-ups’ and avoid AGP wherever possible.¹⁷ It would also appear that the advice of the Chief Dental Officers of Wales, Scotland and Northern Ireland encouraged dental professionals who identified as vulnerable to self-isolate. *Figure 7* provides a chronology of significant events including the advice given by the CDOs and dental regulatory bodies.

Remarkably the pattern of those self-isolating due to either a member of their household suffering from COVID-like symptoms, or self-isolating because they consider themselves vulnerable are well matched. Whilst unusual, it is unlikely that the two events are related.

The pattern of self-isolation in those who reported COVID-like symptoms are less erratic than those in other groups. This most likely is due to the fact that the dental professional is fully conversant with their own symptoms. Peak frequency for those who reported they self-isolated due to COVID-like symptoms was on 16th March (22). For all other groups, the peak frequency for self-isolation occurs seven days later. Typically the incubation period for COVID-19 is 5–6 days, and may be up to 14 days. If the peak on or around 16th March reflects the levels of disease within the community, it may be that some dental professionals were unknowingly infected prior to choosing to self-isolate almost two weeks later. Should this be the case, then this may account for the observational peculiarity within this survey: namely one in ten households where dental professionals chose to self-isolate in order to protect either themselves or another vulnerable member, experienced at least one household member with COVID-like symptoms. Early unrecognised transmission of SARS-CoV-2 is thought to have played a significant role in the spread of infection on the *Diamond Princess*. The authors conclude that significant transmission occurred prior to quarantine.

The mean household size for dental professionals who self-isolated due a member of their household

displaying COVID-like symptoms, or self-isolated to protect a member of their household; was generally larger than the mean household size of those who self-isolated due to individually suffering from COVID-19 symptoms; or individually identified as vulnerable. See *Figure 1*. This may simply reflect that due to their increased size, larger households could be expected to contain at least one household member who identifies as vulnerable. Similarly, by virtue of their size larger households may suffer from double jeopardy: they are more likely to have at least one member who is infected, and additionally contain more potential vectors and opportunities for the disease to enter the household. Smaller households are customarily associated with younger and older adults. The latter are associated with greater incidence of multi-morbidity; accordingly they could be expected to more readily identify as vulnerable.

Aside from at a nation level, this survey neglected to record respondents' geographical location. Accordingly it did was unable to map self-isolation patterns to recognised zones showing elevated rates of infection. Future surveys may be able to provide greater situational awareness by capturing this information at a more granular level.

As a proportion of those registered, the number of respondents for the following registration types was below one percent: dental nurses, dental technicians and orthodontic therapists. Future surveys need to find ways of engaging these vital members of the dental workforce.

Conclusion

This survey is limited by virtue of its self-reporting nature. Ordinarily survey questionnaires should be corroborated by alternative research methods to ensure the information they capture authentically represents the data which they purport to evaluate. Additionally self-reporting questionnaires require verification to confirm they generate reliable results over time. However the current circumstances do not allow sufficient time for the normal processes of acceptance to occur.

Unfortunately, until the risk posed by the novel coronavirus SARS-CoV-2 to dental patients and professionals is evaluated, UK dentistry will remain operating at a basic emergency level. The risks to dental professionals have yet to be quantified due to the general lack of testing. In an attempt to rapidly close this knowledge gap, the present survey reports on the proportion and reasons for self-

isolation amongst dental professionals in the UK in the early pandemic period. In the absence of laboratory confirmed diagnoses, the results of this survey should only be interpreted as a coarse approximation of the level of disease experience in UK dental professionals. However it would appear at the time of publication that dental professionals have not experienced disproportionately higher levels of COVID-like symptoms; and that the COVID-like symptoms reported may simply reflect community levels of disease.

At such times self-reporting surveys may be considered an alternative tool for rapid epidemiological observation where widespread or reliable testing is inadequate or absent.

Declarations

Statement of ethics approval and consent

Prior to data collection, an assessment was made to establish the need for prior ethical review for the survey 'Survey into COVID-19 Self Isolation Patterns in the Dental Team'. The survey was found to be exempt from UK ethical review for the following reasons:

Health Research Authority (HRA)

The Health Research Authority (HRA) 'Does my project require review by a Research Ethics Committee?' (V 2.0) was consulted in conjunction with the HRA online decision tool (<http://www.hra-decisiontools.org.uk/research/>).

The proposed survey was identified as research due to its transferable new knowledge to answer questions with scientifically sound methods and descriptive nature. (Transferable in this context means the findings of a qualitative study can be assumed to be applicable to a similar context or setting.) See Supplementary Material 1.

Accordingly a Stage 2 assessment was made using the online decision tool 'Do I need NHS REC review?' The online decision tool (<http://www.hra-decisiontools.org.uk/ethics/>) was employed for each country within the UK. The online tool established that the survey did not meet the necessary requirements for ethical review. See Supplementary Material, 2, 3, 4, 5.

To confirm the findings of this tool, the UK HRA document 'Standard Operating Procedures for Research Ethics Committees (v7.4, June 2019) was additionally consulted.

Paragraph 1.88 states (page 58),

‘Research involving only staff of health or social care services, who are recruited by virtue of their professional role, and healthcare market research are generally excluded from the scope of REC review (see paragraphs 2.3.13 - 2.3.15 of GAfREC).’

Under the UK HRA Standard Operating Procedures document, the proposed survey did not meet the necessary requirements for ethical review: the research only involved staff of health care services, who are by virtue of their professional role.

Governance arrangements for research ethics committees

Paragraph 2.3.14 of Governance arrangements for research ethics committees (GAfREC): 2020 edition (V2.0 FINAL 26.03.2020) states (page 11),

‘Research involving staff of the services listed in paragraph 2.3.4, who are recruited by virtue of their professional role, does not therefore require REC review except where it would otherwise require REC review under this document (for example, because there is a legal requirement for REC review, or because the research also involves patients or service users as research participants).’

Under GAfREC the proposed survey did not meet the necessary criteria for ethical review.

British Healthcare Business Intelligence Association (BHBIA)

The BHBIA Legal and Ethical Guidelines for Healthcare Market Research guidance (August 2019) was additionally consulted. This was found not to apply to the proposed survey.

GDPR

At the outset, and to avoid invalidating the data due to the survey link being available in the public domain, it was considered necessary to obtain GDC registration numbers for UK dental professionals. It is accepted that it is possible to identify an individual directly from the information being processed (GDC registration number). Whilst in the public domain, this information is classified as personal data and is subject to GDPR data protection principles.

The collection of this personal information was assessed under GDPR data protection principles. The collection of GDC numbers was found to be ‘adequate, relevant and limited to what is necessary in relation to the purposes for which [it is being] processed’.

Consent

To determine the level of consent required the NHS HRA document 'Applying a proportionate approach to the process of seeking consent' (Version No. & Status: v1.02 03.05.2018 FINAL) was consulted.

Paragraph 2.6. Consent in postal/self-completion surveys states (page 16),

'Where identifiable personal data is collected, and 'consent' used as the legal basis for the purposes of compliance with the General Data Protection Regulation (GDPR), then the questionnaire/survey must also include some means by which the participant may actively signify their consent.'

In the proposed survey, this was achieved by providing an explicit consent statement on the landing page:

“*For UK dental professionals

In order that the results of this poll are valid, it will be necessary to collect GDC registration numbers to ensure that there are no duplicate entries.

You can rest assured that this information will remain secure, and once the data has been tested for integrity, in the final analysis the results will be anonymised.

If you are unhappy or uneasy with providing your GDC number, then regretfully you cannot take part in this survey.”

Valid consent was accordingly obtained when survey participants provided their GDC registration number.

Data processing

All the information collected during the survey remained confidential, and encrypted (Bitlocker Driver Encryption). The pseudo-anonymous markers were removed after data validity was confirmed and prior to data-analysis. Only aggregate data has been reported.

Competing interests:

André Haigh declares no competing interests.

Ronuk Vasant declares no competing interests.

Dominic O'Hooley declares no competing interests.

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Tables

Due to technical limitations, Tables 1-3 are provided in the Supplementary Files section.

Captions:

Table 1: Reported primary reason for COVID-19 self-isolation

Table 2: Self-reported symptoms of dental professionals

Table 3: Timeline of key COVID-19 events

Figures

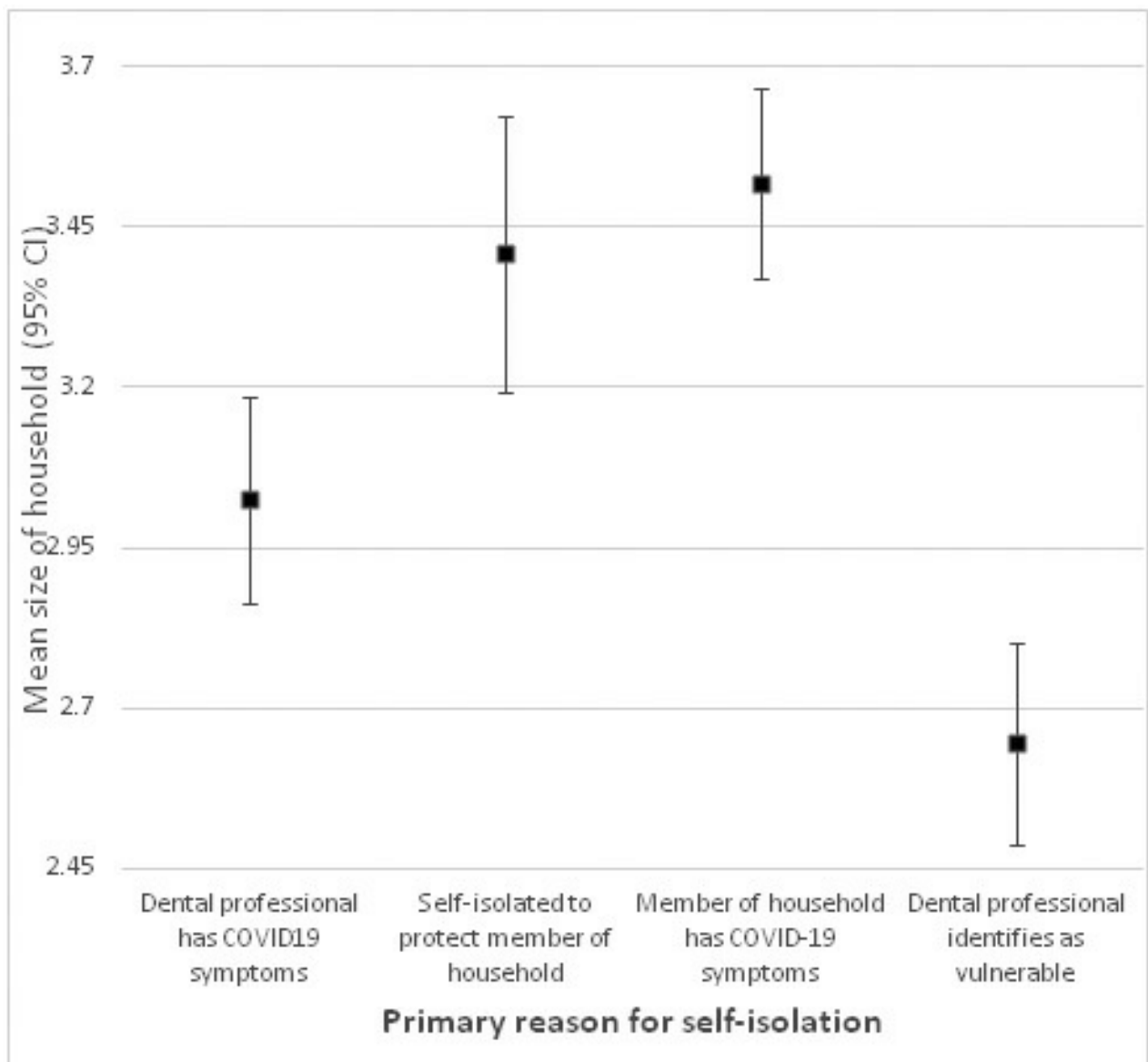


Figure 1

Mean household size and reason for self-isolation

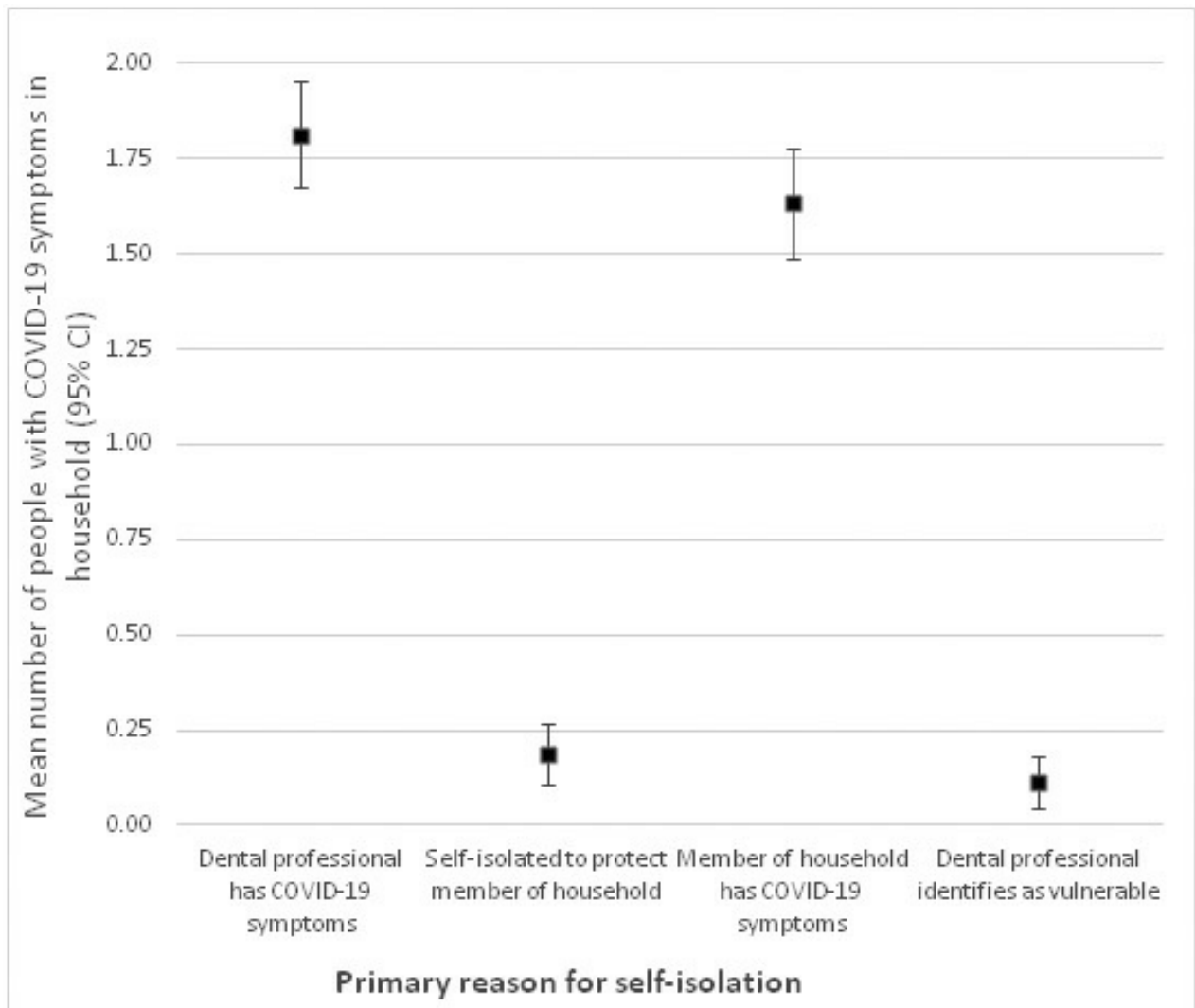


Figure 2

Mean number of people in household with COVID-like symptoms and reason for self-isolation

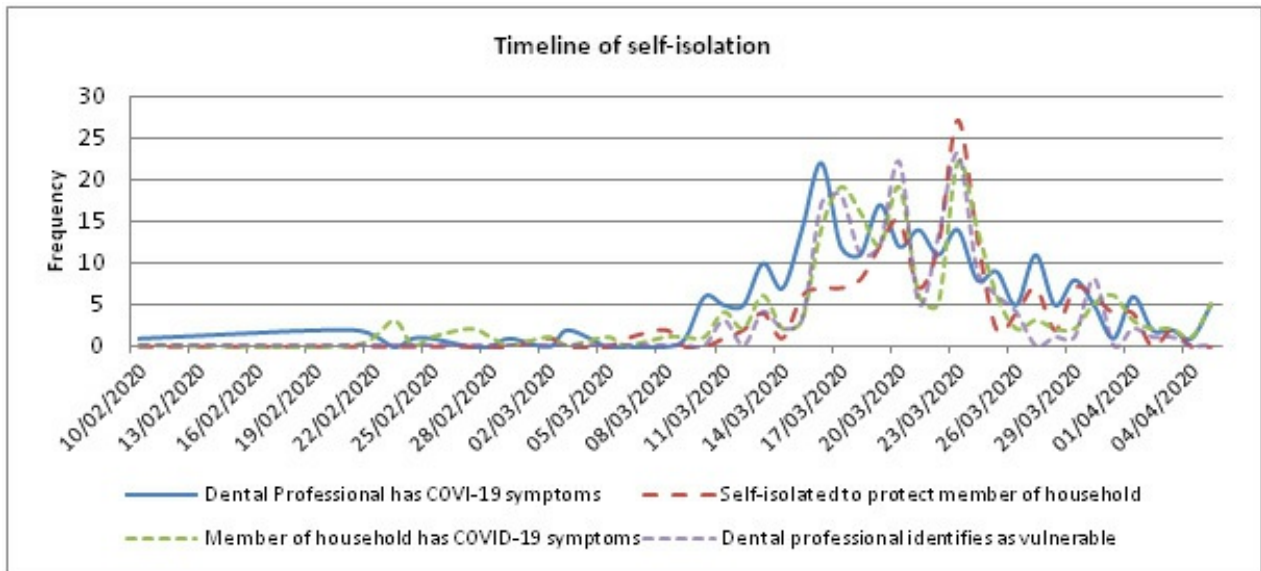


Figure 3

Timeline of reported self-isolation patterns due to COVID-19

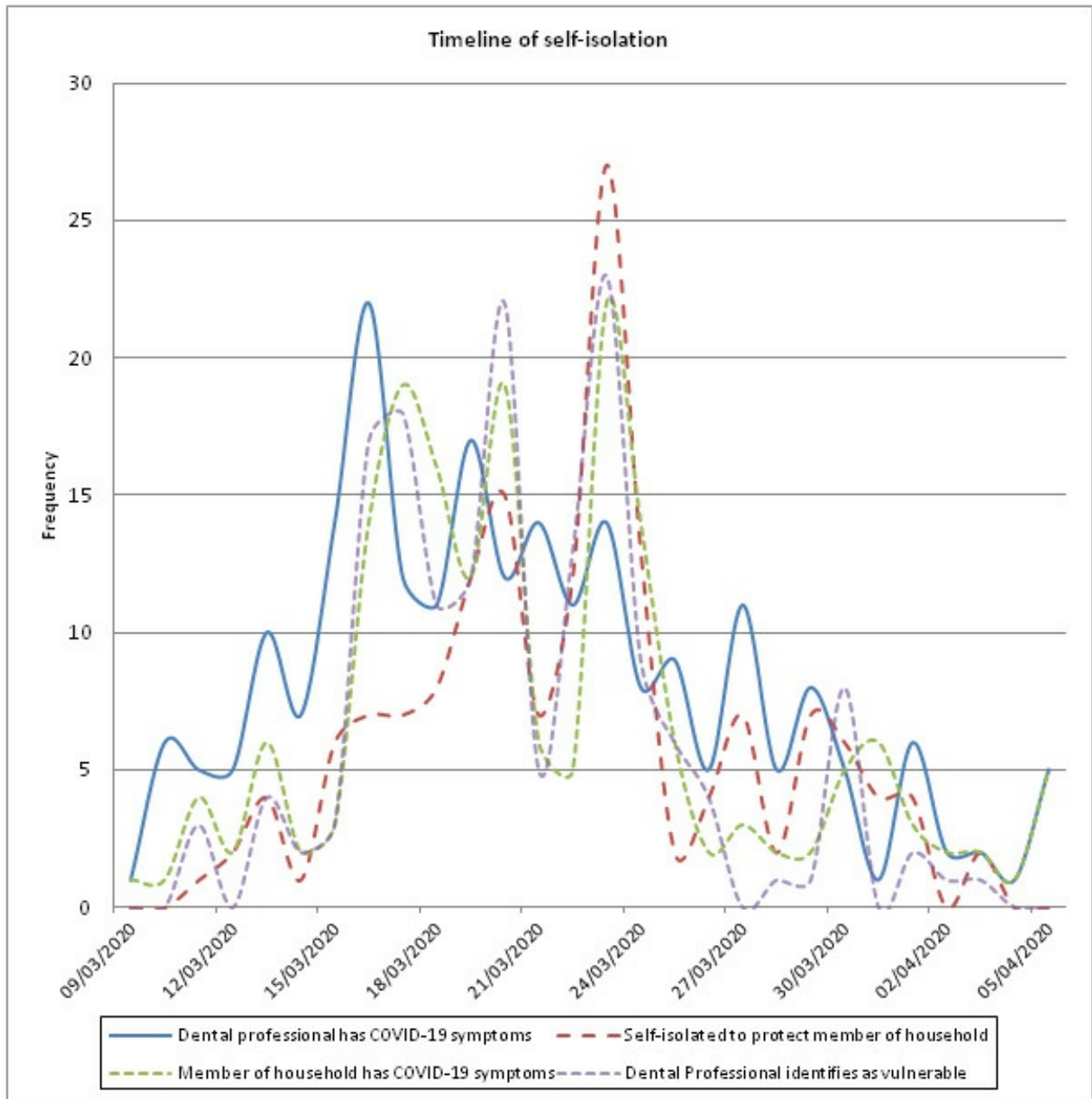


Figure 4

Shows the same data as in Figure 5 but zoomed in to highlight reported self-isolation patterns 9 March - 5 April 2020

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

[Table1.ReportedprimaryreasonforCOVID19selfisolation.jpeg](#)

[Table3TimelineofkeyCOVID19events.jpeg](#)

[Table2.Selfreportedsymptomsofdentalprofessionals.jpeg](#)