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Resumption of Endodontic Practices in COVID-19 Hardest-Hit Area of China: A Web-based Survey

ABSTRACT

Introduction: The purpose of this study was to investigate the resumption of endodontic practices in Hubei Province, China 1 month after the end of the lockdown. Methods: A Web-based survey was sent to 1069 active endodontic specialists and general dentists who provided endodontic care in Hubei Province from May 7 to May 9, 2020. The survey consisted of 18 questions on demographics, the current situation of endodontic practice for the participants, and concerns regarding contracting or spreading the virus in newly opened endodontic practices. Results: A total of 322 participants completed the survey. Most respondents (62%) were from Wuhan. Almost 83% of the respondents have resumed their endodontic practice partially or fully. Most respondents in practice (99%) would take measures to screen patients before treatment including paid screening measures. More than 93% of the respondents reported having taken special measures for routine endodontic treatment at this stage, with the most common measure taken being wearing an N95 mask. The rubber dam was recognized as efficient in preventing infection by most respondents. Many respondents were concerned about contracting coronavirus disease 2019 (COVID-19) as a result of routine endodontic practice at this stage, and respondents with more than 11 years of endodontic experience were significantly less concerned about infection compared with those with fewer than 5 years of experience (P < .05). Conclusions: There is a fear of contracting/spreading COVID-19 among endodontic clinicians, the fear is negatively associated with years of practice, and most clinicians believe that rubber dam isolation can protect them and their patients from COVID-19. (J Endod 2020;46:1577–1583.)

KEY WORDS

COVID-19; endodontic practice; pandemic; resuming; survey

An epidemic coronavirus disease 2019 (COVID-19) caused by a novel coronavirus (severe acute respiratory syndrome–associated coronavirus 2 [SARS-CoV-2]) infection was first reported in Wuhan, the capital city of Hubei Province in China, at the end of December 2019. Since then, it has rapidly spread to other cities of the province, as well as internationally, and has been declared by the World Health Organization as a pandemic on March 11, 2020. As of May 9, 2020, the Health Commission of Hubei Province reported 50,334 cumulative cases in the city of Wuhan and 68,129 cumulative cases in Hubei. Besides transmission by inhalation of virus-laden liquid droplets, close contact with infected persons, and contact with surfaces contaminated with SARS-CoV-2, aerosol transmission has been suggested as an additional method of transmission in confined spaces. A study has found that SARS-CoV-2 could be detected in the air = 2–3 m from infected patients. Several endodontic procedures including high-speed drilling with water spray are aerosol-generating, and endodontic practice, which requires prolonged close face-to-face contact between patients and operators, is regarded as a high risk for cross infection. In consideration of the risk that dental treatment may pose during the COVID-19 outbreak, the Hubei Province government suspended regular dental treatments including routine endodontic treatments and allowed only emergency treatments during the peak of the pandemic.

To block the rapid spread of infection and control the epidemic, China has conducted a series of strict measures including redistributing nationwide resources, shelter-in-place orders, quarantining confirmed cases, and locking down the city of Wuhan on January 23, 2020. The lockdown was found to have delayed the
arrival of COVID-19 in other cities by 2.91 days, and control measures including suspending intra-
public transport, closing entertainment venues, and banning public gatherings were found to be
associated with a reduction in case incidence\(^1\). The current daily new COVID-19 cases in China
have reached a very low level\(^1\). On April 8, 2020, the government declared an end of the lockdown
in Wuhan. People’s lives gradually returned to
normal, and dental services including endodontic
practice have also recently resumed. However,
because no antiviral treatment for coronavirus
infection or vaccine has been proven to be
effective until now\(^2\) and to resume gradually and
safety, several measures are taken by
endodontists and general dentists who provide
endodontic treatments in Hubei Province. In
addition, public health emergencies may
negatively impact the mental health of individuals
including medical staff\(^3\). Thus, the purpose of
this study is to investigate the status of
endodontic practice in Hubei Province 1 month
after the end of the lockdown in Wuhan and the
psychological status of endodontists and
dentists who conduct endodontic treatments.

**MATERIALS AND METHODS**

**Survey Design**

Approval of the study was obtained from the
Ethics Committee of the Wuhan University
School of Stomatology before the investigation
(project number: 2020B31). A descriptive,
cross-sectional survey was generated by using
an online crowdsourcing platform WJX
(https://www.wjx.cn), which provides
functions equivalent to Amazon Mechanical
Turk\(^4\). The questionnaire contained 3 sections
with a total of 18 questions (Supplementary
material). The first section consisted of 5
questions regarding the participants’
demographic information, including age, type
of endodontic practice, years of experience,
the nature of their healthcare facilities, and
location. The second section consisted of 8
questions referring to the current situation of
endodontic practice for the participants. The
third section consisted of 5 questions that
assessed the current concerns of the
participants regarding virus spreading in the
dental office, as well as their view toward the
role of rubber dam in the prevention of cross
infection during endodontic treatments. The
responders who answered “yes” on Question
14 were regarded as healthcare dental
providers who volunteered in medical facilities.

**Distribution of the Survey**

A list of 1069 active endodontic specialists and
general dentists who have provided
endodontic care in Hubei Province was
obtained from the Endodontic Association of
School and Hospital of Stomatology, Wuhan
University, and 2 online chat groups for
endodontic professionals in Hubei Province on
social media software (WeChat)\(^5\). The
questionnaire was distributed via WeChat\(^5\) to
all members on the list from May 7 to May 9,
2020, one month after the end of the lockdown
in Wuhan on April 8, 2020. The study
description and invitations to participate were
sent to each member 4–5 times per day.
Among the completed surveys, those with an
answer time of less than 1 minute or more than
15 minutes were deemed unreliable and were
excluded\(^6\). All participants were assured of
complete anonymity to facilitate collecting
unbiased data.

**Statistical Methods**

Data were exported into Microsoft Excel
(Microsoft Corp, Redmond, WA) and analyzed
with SPSS 23.0 software (SPSS Inc, Chicago,
IL). Descriptive statistics were used for
analysis. The \(\chi^2\) and Fisher exact tests were
performed to explore the relation between
demographic information of respondents and
their recognitions on the change of patient
numbers compared with the same period of
time last year, as well as the important role that
rubber dam plays in preventing cross infection
with severe acute respiratory syndrome
including COVID-19. Generalized linear model
with binary logistic regression was performed to
explore the factors associated with
concerns for infection. Independent variables
included age, type of practice, years of
practice, type of healthcare facility, location,
and participation in COVID-19-related frontline
work. The option “Neither agree nor disagree”
in Question 16 was excluded from the
multivariate logistic regression. All independent
variables were entered into multivariable
analyses. A \(P\) value <.05 was regarded as
significant.

**RESULTS**

A total of 322 participants completed the
survey, representing an overall response rate
of 30.12%. The demographic data of the
respondents are summarized in Table 1. The
respondents were from 15 cities of Hubei
Province, and 200 of them (62.11%) came from
Wuhan. Of the 322 respondents, 152
(47.20%) were 20–30 years old, 114 (35.40%)
were between 36 and 45 years old, 92
(28.57%) were 21–30 years old, 90
(27.95%) were 10–20 years old, 48
(14.91%) were 25–35 years old, and 46
(14.29%) were 36–45 years old. Among
these respondents, 25 (7.77%) worked in dental
dentists, and 73.60% (\(n = 237\)) were
general dentists who provide endodontic care.
Most respondents (\(n = 125, 38.82\%\)) were
from private dental clinics, followed by public
dental hospitals (\(n = 90, 27.95\%\)) and
general hospitals (\(n = 97, 30.12\%\)).

**TABLE 1 - Demographic Information of Respondents**

| Age (y) | Frequency (n) | Percent (%) |
|--------|--------------|-------------|
| ≤25    | 152          | 47.20       |
| 36–45  | 114          | 35.40       |
| 46–55  | 46           | 14.29       |
| ≥56    | 10           | 3.11        |
| Type of practitioner |              |             |
| Endodontist | 85          | 26.40       |
| General dentist | 237         | 73.60       |
| Years of practice |              |             |
| ≤5     | 88           | 27.33       |
| 6–10   | 94           | 29.19       |
| 11–20  | 92           | 28.57       |
| ≥21    | 48           | 14.91       |
| Type of healthcare facility |              |             |
| Public dental clinic | 97          | 30.12       |
| Dental department of public hospital | 90  | 27.95 |
| Private dental clinic | 125         | 38.82       |
| Dental department of private hospital | 10 | 3.11 |
| Location |              |             |
| Wuhan | 200           | 62.11       |
| Other cities in Hubei | 122          | 37.89       |

For the current situation of endodontic
practice, 82.61% of the respondents (\(n = 266\))
resumed their endodontic practice
partially or fully by May 9, 2020. Among
respondents who resumed practice, 65.41% of
them reported a decrease in the number of
patients compared with the same period of
time a year ago, especially the responders in Wuhan (Table 2), and 90.60% of them ($n = 241$) have completed COVID-19 tests for themselves to start practicing again. The most common test used was reverse transcriptase polymerase chain reaction (RT-PCR) to detect viral RNA ($n = 222, 83.46\%$) (Fig. 1A). Most of the respondents ($n = 228, 85.72\%$) would inform patients about the risk of COVID-19 cross infection before endodontic treatment. However, only 37.22\% of the respondents ($n = 99$) required that patients sign an informed consent form (Fig. 1B). Most of the respondents ($n = 262, 98.50\%$) would take measures to screen patients before treatment, with the most common method being taking body temperature measurements (92.86\%), followed by the green code (85.71\%) (Supplemental Table S1 for explanation of the green code) (Fig. 1C). Most respondents have taken paid screening measures (74.44\%), including RT-PCR, antibody tests, chest computed tomography (CT) scan, or any other paid screening measures. Only 5.64\% of respondents reported uncooperative patients who thought that the paid screening measures were unnecessary. Only 17.29\% of respondents reported receiving confirmed or suspected COVID-19 patients who had recovered from COVID-19, confirmed or suspected COVID-19 patients with no symptoms, or patients who have been in close contact with an individual with COVID-19. Besides regular personal protective equipment, 93.61\% of the respondents reported having taken special measures for routine endodontic treatment at this stage, with the most common being N95 mask.

### Table 2 - Chi-Square Tests and Fisher Exact Tests: Influence of the Variables (Age, Type of Practitioner, Years of Practice, Type of Healthcare Facility, and Location) on the Number of Endodontic Patients per Month Compared with That of This Same Period of Time Last Year (Question 7)

| Significant variable | Less ($n = 174$) | More ($n = 60$) | Same ($n = 32$) | $P$ value* |
|----------------------|-----------------|----------------|----------------|------------|
| Location             |                 |                |                |            |
| Wuhan                | 127 (77.0)      | 27 (16.4)      | 11 (6.7)       | <.001      |
| Other cities in Hubei| 47 (46.5)       | 33 (32.7)      | 21 (20.8)      |            |

*All other variables were not significant.

![Figure 1](image-url) - Survey results from 266 responders. Graphically illustrated here is the distribution of answers to the questions (A) “What kinds of COVID-19 tests have you completed for yourself to resume practice? (multiple answer question)” ; (B) “Did you inform patients of their COVID-19 infection risk and required the signature of informed consent form before endodontic treatment?”; (C) “What kinds of patient screening measures will you take before endodontic treatment at this stage? (multiple answer question)” ; (D) “Except standard PPE of gloves, goggles or face shield, mask, and gown, what special measures did you use for routine endodontic treatment? (multiple answer question)”.
(82.33%), followed by a protective suit (68.05%) (Fig. 1D).

According to current concern regarding the possibility of spreading the virus of the participants for endodontic practice, the rubber dam was recognized as an efficient measure for preventing COVID-19 cross infection by most respondents (73.60%), and no significant correlation was observed between the recognition of rubber dam and the demography of the responders (Table 3). A total of 225 respondents felt concerned about COVID-19 infection as a result of routine endodontic practice at this stage. Moreover, 198 respondents were concerned about themselves being infected, 196 were concerned about consequentially infecting their own families, and 173 were concerned about infecting the patients. No significant differences were observed in concerns about infection depending on age of the dentist, type of endodontic practice, type of healthcare facility, location, and participation in COVID-19–related frontline work ($P > .05$).

Participants with more than 21 years of endodontic experience or 11–20 years of endodontic experience were significantly less concerned about infection compared with those who had practiced for fewer than 5 years ($P < .05$) (Table 4).

### DISCUSSION

Although most endodontists and dentists who provide endodontic care have resumed operations since the end of the lockdown, more than half have reported a decrease in the number of patients compared with that of the same period a year ago. In the process of resuming their practice, many dentists including endodontists chose to get tested for COVID-19, with the most common method being RT-PCR. Most respondents would inform patients of the risk of cross infection before endodontic treatment, but only a minority would require that patients sign an informed consent form. Many respondents likely did not require patients to sign an informed consent form out of fear of financial stress as a result of losing patients because patients may end up refusing treatment after reviewing the form.

The diagnosis of COVID-19 is based on clinical features and laboratory tests.

Laboratory tests play an important role in patient screening. Although RT-PCR is widely adopted as a standard method in diagnosing COVID-19, the limitation of this technology is obvious. Existing PCR methods for detecting SARS-CoV-2 have very good specificity but low sensitivity, meaning that false negatives are common, and the test is time-consuming, particularly when performed commercially. The serologic detection method of immunochromatographic (ICG) test for immunoglobulin (Ig) M and IgG antibodies was considered an important supplementary diagnostic approach for SARS-CoV-2–infected patients and could help dentists make a preliminary judgment. Unlike RT-PCR, assay results could be obtained within 15 minutes with a simple device. Chest CT scan was also considered to be an important tool for COVID-19 diagnosis with high accuracy and could be used for patients who need urgent dental care. However, its use as a first-line diagnostic tool has been cautioned against by the American College of Radiologists because of its relatively untested specificity. Recently, a patient with serious dental trauma needing immediate dental treatment was found to be abnormal on chest CT scan imaging in the oral surgery department of one general hospital of Wuhan but tested negative for COVID-19 by a series of diagnostic tests and was eventually excluded of having COVID-19. However, these popular methods are not without limitations. Sharma et al. suggested using saliva as a noninvasive specimen for the early diagnosis and monitoring of SARS-CoV-2 for endodontists on the basis of previous studies.

Several measures have been taken for patient screening, including paid and unpaid measures. Fever was reported to be the most common clinical symptom for patients diagnosed with COVID-19. Unsurprisingly, taking the body temperature was the most common method of patient screening (92.86%) used by respondents in our study. Another method of screening used by many respondents was green code (85.71%). Green code allows individuals to share their travel history and health status in China via WeChat and Alipay. Only 5.64% of the respondents reported uncooperative patients who thought that the paid screening measures used by the dentists or endodontists were unnecessary. Even though the local government has ensured that costs associated with paid

### TABLE 3 - Chi-Square Tests and Fisher Exact Tests: Influence of the Variables (Age, Type of Practitioner, Years of Practice, Type of Healthcare Facility, and Location) on the Important Role of Rubber Dam in Preventing Cross Infection with Severe Acute Respiratory Syndrome Including COVID-19 (Question 18)

| Variables                        | Agree (n = 237) | Do not know (n = 67) | Disagree (n = 18) | $P$ value |
|----------------------------------|----------------|---------------------|------------------|-----------|
| Age (y)                          |                |                     |                  |           |
| <35                              | 111 (73.0)     | 32 (21.1)           | 9 (5.9)          | .087      |
| 36–45                            | 84 (73.7)      | 24 (21.1)           | 6 (5.3)          |           |
| 46–55                            | 37 (80.4)      | 9 (19.6)            | 0 (0.0)          |           |
| >56                              | 8 (50.0)       | 2 (20.0)            | 3 (30.0)         |           |
| Type of practitioner             |                |                     |                  | .850      |
| Endodontist                      | 64 (75.3)      | 16 (18.8)           | 5 (5.9)          |           |
| General dentist                  | 173 (73.0)     | 51 (21.5)           | 13 (5.5)         | .873      |
| Years of practice                |                |                     |                  |           |
| <5                               | 66 (75.0)      | 18 (20.5)           | 4 (4.5)          |           |
| 6–10                             | 69 (73.4)      | 20 (21.3)           | 5 (5.3)          |           |
| 11–20                            | 69 (75.0)      | 19 (20.7)           | 4 (4.3)          |           |
| >21                              | 33 (68.8)      | 10 (20.8)           | 5 (10.4)         |           |
| Type of healthcare facility      |                |                     |                  | .375      |
| Public dental clinic             | 76 (78.4)      | 17 (17.5)           | 4 (4.1)          |           |
| Dental department of public hospital | 63 (70.0)     | 23 (25.6)           | 4 (4.4)          |           |
| Private dental clinic            | 91 (72.8)      | 26 (20.8)           | 8 (6.4)          |           |
| Dental department of private hospital | 7 (70.0)      | 1 (10.0)            | 2 (20.0)         |           |
| Location                         |                |                     |                  | .271      |
| Wuhan                            | 153 (76.5)     | 36 (18.0)           | 11 (5.5)         |           |
| Other cities in Hubei            | 84 (68.9)      | 31 (25.4)           | 7 (5.7)          |           |
Therefore, the risk is legitimate. In this study, psychological problems were expressed concerns about becoming infected with COVID-19 as a result of endodontic treatments. Outbreaks of infectious diseases, especially COVID-19, which might result in 93.61% of respondents having taken special precautions or suspected COVID-19 patients who complained about testing costs. Almost one-fifth of the respondents reported receiving confirmed or suspected COVID-19 patients who have recovered after treatment, confirmed or suspected COVID-19 patients with no symptoms, or patients who have been in close contact with an individual with COVID-19, which might result in 93.61% of respondents having taken special protective measures for routine endodontic treatments.

More than half of respondents (69.88%) expressed concerns about becoming infected with COVID-19 as a result of endodontic practice. Outbreaks of infectious diseases, including COVID-19, typically result in widespread fear, anxiety, and a variety of psychological problems. Some studies have reported on dentists becoming infected through their social contacts or dying; therefore, the risk is legitimate. In this study, only 3 respondents (1.3%) indicated that they were positive on one of the tests, and 2 of them have worked on the frontline during the outbreak. Whether these or dental professionals in other studies became positive as a result of professional exposure is unknown. Nonetheless, professional mental health services should be made available to aid the psychological well-being of the population in highly affected areas including endodontists. Respondents expressed concerns about themselves, their family, and their patients. The importance of rubber dam isolation for helping minimize the production of saliva- and blood-contaminated aerosol or spatter has been emphasized in previous studies and was agreed on by most of the respondents in the present study. No significant difference was observed between endodontists and general dentists on their view toward the role of rubber dam in the prevention of cross infection during endodontic treatments in our study. Because the general dentists surveyed were an intermediary category of dentists with some postgraduate education in and who practiced endodontics, they had similar education background with endodontists.

During the COVID-19 pandemic, the healthcare system was overburdened, as was the case in Wuhan. Many healthcare workers including dentists and endodontists volunteered to work with COVID-19 patients at designated hospitals, fever clinics, and quarantine sites during the peak of the pandemic. As of March 24, 2020, the Chinese Stomatological Association reported that approximately 288 dentists in Wuhan and 490 dentists in Hubei Province volunteered to work on the frontlines. In our study, 70 respondents (21.74%) admitted having worked on the frontlines. A previous study reported that respondents who had worked on the frontlines reported burnout at a lower frequency and were less concerned about being infected than respondents working in wards. The authors proposed that those who worked on the frontlines may have had more experience and knowledge as a result of directly caring for COVID-19 patients, leading to the observed differences in attitudes between the groups. Contrary to these findings, we did not observe such differences in our sample. Instead, a negative correlation was observed between years of practice and concerns about infection. Respondents who have been practicing longer may have felt a greater sense of control associated with more experience. Most of the respondents in this particular study who have been practicing longer are younger than 56. Further studies may be necessary to determine whether the same correlation would be true for older individuals (>65 years old) because old age was widely reported to be associated with a poorer prognosis.

This study has several limitations. First, the small sample size may produce a clustering effect. Second, although participants were assured of their anonymity, concerns about being identified may have affected their answers. However, the study found that there is a fear of contracting/spreading COVID-19 among endodontic clinicians, the fear is negatively associated with years of practice, and most clinicians believe that rubber dam isolation can protect them and their patients from COVID-19.

### TABLE 4 - Multivariable Linear Regression: Influence of the Independent Variables (Age, Type of Practitioner, Years of Practice, Type of Healthcare Facility, Location, and Participation in COVID-19 Related Frontline Work) on Concern For Becoming Infected with COVID-19 from Endodontic Practice (Question 16*)

| Independent variables | Odds ratio | 95% Confidence interval | P value |
|-----------------------|------------|------------------------|--------|
| Age (y)               |            |                        |        |
| ≤ 35                  | Reference  |                        | .051   |
| 36-45                 | 3.07       | (1.32–7.14)            | .009   |
| 46-55                 | 4.89       | (1.10–21.68)           | .037   |
| ≥ 66                  | 4.03       | (0.52–31.26)           | .182   |
| Type of practitioner  |            |                        |        |
| General dentists      | Reference  |                        |        |
| Endodontist           | 1.24       | (0.59–2.59)            | .566   |
| Years of practice     |            |                        |        |
| ≤ 5                   | Reference  |                        | .035   |
| 6-10                  | 0.68       | (0.32–1.44)            | .313   |
| 11-20                 | 0.33       | (0.12–0.88)            | .027   |
| ≥ 21                  | 0.10       | (0.02–0.50)            | .005   |
| Type of healthcare facility |      |                        |        |
| Public dental clinic  | Reference  |                        |        |
| Dental department of public hospital | 0.96 | (0.44–2.13) | .923 |
| Private dental clinic | 1.18       | (0.53–2.66)            | .684   |
| Dental department of private hospital | 0.70 | (0.16–3.28) | .647 |
| Location              |            |                        |        |
| Wuhan                 | Reference  |                        |        |
| Other cities in Hubei | 1.08       | (0.60–1.94)            | .804   |
| Participation in COVID-19 related frontline work | Yes | Reference | 0.88 | (0.43–1.81) | .729 |
| No                    |            |                        |        |

The bold font indicates the factors with *P < .05.*

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**CREDIT AUTHORSHIP CONTRIBUTION STATEMENT**

**Jingjing Yu:** Data curation, Formal analysis, Funding acquisition, Investigation, Writing – original draft, Revision.

**Fang Hua:** Conceptualization, Data curation, Methodology, Formal analysis, Validation.

**Ya Shen:** Conceptualization, Methodology, Writing – review & editing, Revision.

**Markus Haapasalo:** Validation, Writing – review & editing, Revision.

**Danchen Qin:** Data curation, Formal analysis.

**Dan Zhao:** Conceptualization, Project administration, Resources, Writing – original draft, Supervision, Writing – review & editing, Revision.

**Bin Peng:** Conceptualization, Resources, Validation, Supervision, Writing – review & editing.

**Ashraf Fouad:** Conceptualization, Methodology, Writing – review & editing, Revision.
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Jingjing Yu and Fang Hua contributed equally to this study.

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REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet 2020;395:470–3.
2. Zhang J, Lin G, Zeng J, et al. Challenges of SARS-CoV-2 and lessons learnt from SARS in Guangdong Province, China. J Clin Virol 2020;126:104341.
3. World Health Organization. Coronavirus disease (COVID-19) outbreak situation. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019. Accessed March 21, 2020.
4. Health Commission of Hubei Province. Epidemic situation of new coronary pneumonia in Hubei Province on May 9, 2020. Available at: http://wjw.hubei.gov.cn/bmdt/ztzl/fkxxgzbdrfyyq/xxfb/202005/c20200510_2266275.shtml. Accessed May 10, 2020.
5. Liu Y, Ning Z, Chen Y, et al. Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. Nature 2020;582:557–60.
6. Guo ZD, Wang ZY, Zhang SF, et al. Aerosol and surface distribution of severe acute respiratory syndrome coronavirus 2 in hospital wards, Wuhan, China. Emerg Infect Dis 2020;26:1583–91.
7. Samaranayake LP, Peiris M. Severe acute respiratory syndrome and dentistry: a retrospective view. J Am Dent Assoc 2004;135:1292–302.
8. Prati C, Pelliccioni GA, Sambri V, et al. COVID-19: its impact on dental schools in Italy, clinical problems in endodontic therapy and general considerations. Int Endod J 2020;53:723–5.
9. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J Dent Res 2020;99:481–7.
10. Liu J, Zhou J, Yao J, et al. Impact of meteorological factors on the COVID-19 transmission: a multi-city study in China. Sci Total Environ 2020;726:138513.
11. Tian H, Liu Y, Li Y, et al. An investigation of transmission control measures during the first 50 days of the COVID-19 epidemic in China. Science 2020;368:638–42.
12. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497–506.
13. Chen Q, Liang M, Li Y, et al. Mental health care for medical staff in China during the COVID-19 outbreak. Lancet Psychiatry 2020;7:e15–6.
14. Wu SJ, Bai X, Fiske ST. Admired rich or resented rich? how two cultures vary in envy. J Cross Cult Psychol 2018;49:1114–43.
15. Yang Y, Zhou Y, Liu X, Tan J. Health services provision of 48 public tertiary dental hospitals during the COVID-19 epidemic in China. Clin Oral Invest 2020;24:1861–4.
16. Liu N, Zhang F, Wei C, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: gender differences matter. Psychiat Res 2020;287:112921.
17. Kucirka LM, Lauer SA, Laeyendecker O, et al. Variation in false-negative rate of reverse transcriptase polymerase chain reaction–based SARS-CoV-2 tests by time since exposure. Ann Intern Med 2020;M20–1495.
18. Kang S, Peng W, Zhu Y, et al. Recent progress in understanding 2019 novel coronavirus (SARS-CoV-2) associated with human respiratory disease: detection, mechanisms and treatment. Int J Antimicrob Ag 2020;55:105950.
19. Ashokka B, Loh M, Tan CH, et al. Care of the pregnant woman with COVID-19 in labor and delivery: anesthesia, emergency cesarean delivery, differential diagnosis in the acutely ill parturient, care of the newborn, and protection of the healthcare personnel. Am J Obstet Gynecol 2020;223:66–74.
20. Giudice A, Antonelli A, Bennardo F. To test or not to test? an opportunity to restart dentistry sustainably in “COVID-19 era”. Int Endod J 2020;53:1020–1.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found in the online version at www.jendodon.com (10.1016/j.joen.2020.08.001).
21. Zhang Z, Shen Y, Wang H, et al. High-resolution computed tomographic imaging disclosing COVID-19 pneumonia: a powerful tool in diagnosis. J Infect 2020;81:318–56.

22. Liu D, Li L, Wu X, et al. Pregnancy and perinatal outcomes of women with coronavirus disease (COVID-19) pneumonia: a preliminary analysis. Am J Roentgenol 2020;215:127–32.

23. Sharma S, Kumar V, Chawla A, Logani A. Rapid detection of SARS-CoV-2 in saliva: can an endodontist take the lead in point-of-care COVID-19 testing? Int Endod J 2020;53:1017–9.

24. To KK, Tsang OT, Yip CC, et al. Consistent detection of 2019 novel coronavirus in saliva. Clin Infect Dis 2020;71:841–3.

25. Sabino-Silva R, Jardim ACG, Siqueira WL. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis. Clin Oral Invest 2020;24:1619–21.

26. Kummitha RK, Smart technologies for fighting pandemics: the techno- and human-driven approaches in controlling the virus transmission. Gov Inform Q 2020;101481.

27. Healthcare Security Administration of Hubei Province. Hubei: public medical insurance covers COVID-19 tests, including RT-PCR for virus RNA and ICG assay for IgM and IgG. Available at: http://ybj.hubei.gov.cn/lbdj/zxgkml/zcwj/gfwj/202005/t20200505_2359711.shtml. Accessed May 5, 2020.

28. Ing EB, Xu QA, Salimi A, Torun N. Physician deaths from corona virus (COVID-19) disease. Occupational Medicine 2020;70:370–4.

29. Ethics Subcommittee of the Council on Ethics, Bylaws, and Judicial Affairs. Ethical practice during the COVID-19 pandemic. J Am Dent Assoc 2020;151:377–8.

30. Feng Z, Cheng Y, Chen J, et al. Chinese medical personnel against the 2019-nCoV. J Infect 2020;80:578–606.

31. Data of oral health care personnel who entered Hubei’s hot clinics, isolation points and isolation wards. Available at: http://www.cndent.com/archives/68391. Accessed March 24, 2020.

32. Wu Y, Wang J, Luo C, et al. A comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 epidemic in Wuhan, China. J Pain Symptom Manag 2020;60:e60–5.
Sample Questionnaire

1. Please select your age group:
   A. ≤ 35 years
   B. 36-45 years
   C. 46-55 years
   D. ≥ 56 years
2. What’s your type of practitioner?
   A. Endodontist
   B. General dentist
3. Years since conducting endodontic treatments independently:
   A. ≤ 5 years
   B. 6-10 years
   C. 11-20 years
   D. ≥ 21 years
4. What’s your type of your healthcare facility?
   A. Public dental clinic
   B. Dental department of public hospital
   C. Private dental clinic
   D. Dental department of private hospital
5. The location of your healthcare facility
   A. Wuhan
   B. Other cities in Hubei
6. Has your endodontic practice recovered from COVID-19 disruption?
   A. Recovered totally
   B. Recovered partially
   C. Still suspended
If your endodontic practice is still suspended, jump to question 18
7. How does the number of endodontic patients per month compare to that of this same period of time last year?
   A. Less
   B. More since resuming practice
   C. Almost the same
8. What kinds of COVID-19 tests have you completed for yourself to resume practice? (multiple answer question)
   A. RT-PCR for virus RNA
   B. ICG assay for IgM and IgG
   C. chest CT
   D. Other tests
   E. No test
9. Was your test result abnormal, including any positive result of RT-PCR, antibodies tests, abnormal chest CT scan imaging or any other abnormal result?
   A. Yes
   B. No
   C. No test
10. Did you inform patients of their COVID-19 infection risk, and required the signature of informed consent form from patients before endodontic treatment?
    A. Both
    B. Inform the risk to patients, but not required the signature of consent form
    C. Neither
11. What kinds of patient screening measures will you take before endodontic treatment at this stage? (multiple answer question)
    A. Green code
    B. Body temperature test
    C. Questionnaire of epidemiological history
    D. Results of RT-PCR for virus RNA within last five days
    E. Results of ICG assay for IgM and IgG within last five days
    F. Results of chest CT within last five days
    G. Other measures
    H. No measure
12. What is the most common attitude of your patients towards paid screening measures?
    A. Feel it is necessary, affordable and cooperative
    B. Feel it is necessary, but complain about payment and does not cooperate very well
    C. Feel it is unnecessary, and uncooperative
    D. No paid screening measure taken
13. Except standard PPE of gloves, googles or face shield, mask and gown, what special measures did you use for routine endodontic treatment? (multiple answer question)
   A. N95 mask
   B. Protective suit
   C. Oral aerosol vacuum
   D. Powered air-purifying respirator
   E. Plexiglass aerosol shield for microscope
   F. Negative pressure operatory for treating COVID-19 positive or suspected patients
   G. Other measures
   H. Nothing special

14. Have you taken part in the work on front-line of COVID-19 of treating confirmed or suspected COVID-19 patients including designated hospitals, fever clinic, quarantine sites?
   A. Yes
   B. No

15. Have you received confirmed or suspected COVID-19 patients who have recovered after treatment, confirmed or suspected COVID-19 patients with no symptoms, or patients who have been in close contact to a COVID-19 patient, including referred and treated patients?
   A. Yes
   B. No

16. I am concerned for becoming infected with COVID-19 from endodontic practice.
   A. Agree/strongly agree
   B. Neither agree nor disagree
   C. Disagree/strongly disagree

17. What are the reasons behind your concern? (multiple answer question)
   A. Concerned for myself becoming infected with COVID-19
   B. Concerned for my family becoming infected with COVID-19
   C. Concerned for my patient becoming infected with COVID-19 during treatment
   D. Other reasons

18. The rubber dam plays an important role in preventing cross infection with severe acute respiratory syndrome including COVID-19.
   A. Agree/strongly agree
   B. Don’t know
   C. Disagree/strongly disagree

*The “health code” service-run on the ubiquitous platforms Alipay and WeChat and developed for the Chinese government-give users color-coded designations based on their health status and travel history, and a QR code that can be scanned by authorities. People given a green code are allowed to travel relatively freely.