COVID-19 affected patients' utilization of dental care service

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The novel coronavirus disease 2019 (COVID-19), characterized by symptoms of fever and pneumonia, was reported in Wuhan, China, at the end of 2019 (Phelan, Katz, & Gostin, 2020). Given the likely transmission of COVID-19 via droplets and aerosols during dental clinical procedures, dental practitioners are at a high risk of COVID-19 infections (Ather, Patel, Ruparel, Diogenes, & Hargreaves, 2020). According to the guidelines of the Chinese Stomatological Association (CSA), dental clinics in China suspended the routine dental services and only provided emergency dental care between January and April 2020 (CSA, 2020). The objective of the study was to investigate the influence of COVID-19 on patients' utilization of dental services during the COVID-19 pandemic.

This study was carried out from April 20 to April 27 after the hospital reopening to the public and was approved by the Ethics Committee of Nanjing Stomatological Hospital. A total of 1,032 patients with a dental appointment record in the Nanjing Stomatological Hospital were recruited in the study. A 24-item questionnaire was used to survey patients' demographics, psychological state, behaviour and awareness of COVID-19, and their evaluations on the current dental services (Appendix S1). Sample size was calculated based on the data obtained from the hospital registration system, using a power of 95% and a 3.07% margin of error. Statistical analysis was performed using SPSS 16 (IBM, USA). Kruskal–Wallis H tests were performed to explore the associated factors of different degrees of stress during dental health care visit. p-Value <.05 was considered significant.

A total of 956 valid questionnaires were collected, yielding a response rate of 92.6%. Most respondents were females (65.1%), adults < 40 years old (72.3%), living in this city (82.9%) and re-visit patients (75.5%) (Table 1). The main reason for patients' visit

### Table 1 Characteristics of the patients included in the study

| Variable                        | Categories          | N (%)       |
|---------------------------------|---------------------|-------------|
| Gender                          | Male                | 328 (34.9%) |
|                                 | Female              | 611 (65.1%) |
| Age                             | <20                 | 81 (8.5%)   |
|                                 | 20–39               | 608 (63.8%) |
|                                 | 40–59               | 206 (21.6%) |
|                                 | 60–79               | 57 (6.0%)   |
|                                 | ≥80                 | 1 (0.1%)    |
| Residence                       | Nanjing, China      | 780 (82.9%) |
|                                 | Other cities        | 161 (17.1%) |
| Education background            | Postgraduate or above | 85 (9.0%) |
|                                 | Undergraduate       | 382 (40.3%) |
|                                 | Junior college      | 294 (31.0%) |
|                                 | High school or under | 187 (19.7%) |
| Employment status               | Unemployed          | 355 (37.2%) |
|                                 | Working/studying    | 599 (62.8%) |
| Impact on income                | Major impact        | 307 (32.3%) |
|                                 | No or minor impact  | 644 (67.7%) |
| First visit to our hospital     | Yes                 | 233 (24.5%) |
|                                 | No                  | 717 (75.5%) |
| Reasons of the appointment      | Tooth filling       | 165 (17.3%) |
|                                 | Tooth extraction    | 114 (11.9%) |
|                                 | Dental prosthesis   | 72 (7.5%)   |
|                                 | Orthodontics        | 271 (28.4%) |
|                                 | Teeth cleaning      | 47 (4.9%)   |
|                                 | Tooth implant       | 87 (9.1%)   |
|                                 | Surgery             | 16 (1.7%)   |
|                                 | Others              | 183 (19.2%) |

Jiang and Tang contributed equally to this work.
TABLE 2  Patients’ psychology, behaviour, awareness and satisfaction with the COVID-19 pandemic

| Variables                        | Personal psychological states | N (%) |
|----------------------------------|-------------------------------|-------|
| Psychology                       | Nervous                       | 75 (7.9%) |
|                                  | A little worried              | 660 (69.1%) |
|                                  | Not afraid                    | 220 (23%) |
| Risk of infection during dental visit | High risk                    | 96 (10.3%) |
|                                  | Moderate risk                 | 815 (87.1%) |
|                                  | No risk                       | 25 (2.7%) |
| Main factor affecting your visit  | Afraid of potential pandemic in the hospital | 747 (80%) |
|                                  | Crowded people in the hospital | 466 (49.9%) |
|                                  | Preventive measures of the hospital | 362 (38.8%) |
|                                  | Socioeconomic status          | 177 (19%) |
| Ways to know about COVID−19      | Media                         | 909 (95.5%) |
|                                  | Chat or online chat           | 365 (38.3%) |
|                                  | Propaganda from hospital       | 256 (26.9%) |
|                                  | No idea                       | 15 (1.6%) |
| PPE besides facial masks         | Yes                           | 186 (19.5%) |
|                                  | No                            | 751 (80.1%) |
| Frequency of hand washing        | Increased                     | 924 (98.9%) |
|                                  | Not increased                 | 10 (1.1%) |
| Views on asymptomatic infections | High risk and improve protections | 803 (85.8%) |
|                                  | Low risk                      | 75 (8%) |
|                                  | No idea                       | 58 (6.2%) |
| Nucleic acid test before dental treatment | Agree                      | 557 (59.8%) |
|                                  | Disagree                      | 374 (40.2%) |
| Influence on the dental visit    | Go to a nearby clinic with fewer patients | 303 (32.4%) |
|                                  | Postpone dental visit         | 347 (37.2%) |
|                                  | No influence                  | 284 (30.4%) |
| Estimated duration of the COVID−19 | Within three months           | 299 (32%) |
|                                  | Within six months             | 381 (40.8%) |
|                                  | Within a year                 | 208 (22.3%) |
|                                  | More than a year              | 45 (4.8%) |
| Usage of the hospital online consultation system | Yes                        | 251 (26.3%) |
|                                  | No                            | 703 (73.7%) |
| Satisfaction with the hospital online consultation system | Satisfied            | 106 (42.2%) |
|                                  | Not satisfied                  | 145 (57.8%) |
| Satisfaction with the current appointment system | Satisfied            | 454 (47.6%) |
|                                  | Not satisfied                  | 499 (52.4%) |

In summary, the COVID-19 pandemic significantly affected patients’ dental care-seeking psychology and behaviour. The long-term impact of the virtual pandemic still needs further study.
| Variables         | Psychological state | Not afraid | A little worried | Nervous | p-value |
|-------------------|---------------------|------------|-----------------|---------|---------|
| Gender            |                     |            |                 |         |         |
| Male              | 101 (30.8%)         | 197 (60.1%)| 30 (9.1%)       | .005    |         |
| Female            | 118 (19.3%)         | 448 (73.4%)| 44 (7.2%)       |         |         |
| Age               |                     |            |                 |         |         |
| <20               | 22 (27.2%)          | 55 (67.9%) | 4 (4.9%)        | .529    |         |
| 20–39             | 125 (20.6%)         | 441 (72.7%)| 41 (6.8%)       |         |         |
| 40–59             | 52 (25.2%)          | 134 (65%)  | 20 (9.7%)       |         |         |
| 60–79             | 21 (36.8%)          | 27 (47.4%) | 9 (15.8%)       |         |         |
| ≥80               | 0 (0%)              | 1 (100%)   | 0 (0%)          |         |         |
| Residence         |                     |            |                 |         |         |
| Nanjing           | 189 (24.3%)         | 536 (68.8%)| 54 (6.9%)       | .021    |         |
| Other cities      | 30 (18.6%)          | 111 (68.9%)| 20 (12.4%)      |         |         |
| Education         |                     |            |                 |         |         |
| High school or under | 41 (22%)           | 130 (69.9%)| 15 (8.1%)       | .342    |         |
| Junior college    | 59 (20.1%)          | 212 (72.1%)| 23 (7.8%)       |         |         |
| Undergraduate     | 100 (26.2%)         | 255 (66.8%)| 27 (7.1%)       |         |         |
| Postgraduate or above | 19 (22.4%)       | 58 (68.2%) | 8 (9.4%)        |         |         |
| Employment status |                     |            |                 |         |         |
| Unemployed        | 98 (27.6%)          | 224 (63.1%)| 33 (9.3%)       | .128    |         |
| Working/studying  | 122 (20.4%)         | 435 (72.7%)| 41 (6.9%)       |         |         |
| Impact on income  |                     |            |                 |         |         |
| Major impact      | 58 (18.9%)          | 211 (68.7%)| 38 (12.4%)      | .001    |         |
| No/minor impact   | 162 (25.2%)         | 444 (69.1%)| 37 (5.8%)       |         |         |
| First visit to our hospital |   |            |                 |         |         |
| Yes               | 47 (20.2%)          | 159 (68.2%)| 27 (11.6%)      | .031    |         |
| No                | 173 (24.1%)         | 498 (69.5%)| 46 (6.4%)       |         |         |

The bold entries indicated the statistical significance when the p-value was below .05.

**CONFLICT OF INTEREST**

All authors have no conflicts of interest to declare.

**AUTHOR CONTRIBUTION**

Yuanyuan Jiang: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing-original draft; Writing-review & editing. Tianyi Tang: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing-original draft; Writing-review & editing. Li Mei: Data curation; Formal analysis; Investigation; Methodology; Software; Supervision; Validation; Visualization; Writing-review & editing. Huang Li: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing-original draft; Writing-review & editing.

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**PEER REVIEW**

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SUPPORTING INFORMATION
Additional supporting information may be found online in the Supporting Information section.

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