

## ORIGINAL ARTICLE

# Impact of COVID-19 epidemic on live online dental continuing education

Xiaoqiang Liu  | Jianfeng Zhou | Li Chen | Yang Yang | Jianguo Tan

Department of Prosthodontics, Peking University School and Hospital of Stomatology, National Clinical Research Center for Oral Diseases, National Engineering Laboratory for Digital and Material Technology of Stomatology, Beijing Key Laboratory of Digital Stomatology, Beijing, China

**Correspondence**

Jianguo Tan, Department of Prosthodontics, Peking University School and Hospital of Stomatology, Beijing, China.  
Email: tanwume@vip.sina.com

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**Abstract**

**Introduction:** This study aimed to assess live online dental continuing education during COVID-19 epidemic in China.

**Methods:** Twenty-one institutions providing live online dental courses in China during COVID-19 epidemic enrolled in this study. Their online and/or offline course provision before and during the epidemic was retrospectively inquired. If live online education was provided, the number of courses, duration and number of participants per week were further investigated. Time distributions of live online dental courses were recorded and classified as within working time and out of working time. The test period of COVID-19 epidemic was for two weeks between 16 February and 29 February 2020. The control period of pre-COVID-19 epidemic was for ten weeks between 01 November 2019 and 09 January 2020.

**Results:** The percentages of offline and online courses provided by 21 dental continuing education institutions before COVID-19 epidemic were 95.2% (20 out of 21) and 28.6% (6 out of 21), respectively. All the institutions suspended offline courses whilst providing two live online courses, on average, per week with 188 minutes duration and 7290 participants during the epidemic. The total number of online courses for 10 weeks before the epidemic was 33, and that for two weeks during the epidemic was 119. The proportion of courses provided within working time raised from 6.1% (2 out of 33) of pre-COVID-19 to 46.2% (55 out of 119) during COVID-19. There were significant differences between before and during the epidemic ( $P < .001$ ).

**Conclusion:** The dental continuing education transferred from offline to online dramatically, and live online dental continuing education increased significantly during COVID-19 epidemic in China.

**KEYWORDS**

COVID-19, dental education, distance learning, epidemics

## 1 | INTRODUCTION

At the end of 2019, COVID-19 epidemic was first reported in Wuhan, China.<sup>1</sup> The novel coronavirus, severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2),<sup>2,3</sup> rapidly transmitted

throughout China, and a growing number of countries reported cases from the virus.<sup>4</sup> China responded quickly and took proactive measures to combat COVID-19. Respiratory droplets and close contact are the main routes of transmission,<sup>5</sup> and social distancing to prevent spreading of SARS-CoV-2 is one of the most important

interventions used. According to Chinese authorities' recommendations and fear of COVID-19, people were reluctant to go outside from late January through March 2020. The aetiology, transmission routes, treatments, outcomes, control, and prevention of COVID-19 are receiving much research attention.<sup>6</sup> However, as the outbreak prolonged, its potential impacts on dental education should not be overlooked.

Our previous studies showed the dental services provision and people's utilisation of dental services have been strongly influenced by COVID-19 epidemic.<sup>7,8</sup> The public tertiary dental hospitals suspended general non-emergency dental treatments whilst providing emergency dental services,<sup>7</sup> and the private dental offices were completely closed. The number of emergency dental visitors reduced at the beginning of COVID-19 epidemic.<sup>8</sup> Within the limited studies, we can report with confidence that dental professionals had more free time at their disposal than previously. Before the epidemic, lack of time was the most important barrier to attending continuing education activities that contribute to the career-long learning and personal development of dental professionals.<sup>9</sup> Therefore, some dentists used the free time to take part in continuing dental education to update theoretic knowledge and clinical skills.

Although in-person continuing education remains the most frequent and most preferred format, distance education is gaining in popularity with dental profession as it is accessible and flexible in terms of when and where it is used.<sup>10</sup> Distance education provides knowledge to learners who are not physically "on-site" to receive their learning.<sup>11</sup> The non-face-to-face approach overcomes the place constraint in traditional educational settings. It thus has great advantages in the period of COVID-19 epidemic that holds people back from meeting up. Live online is a synchronous and live virtual classroom delivered to personal intelligent terminals such as smartphones, laptops and tablet computers via the Internet. It is one of the most dynamic, enriching forms and well-received methods of distance education.<sup>12</sup> In the light of these findings, the present study aimed to assess live online dental continuing education during COVID-19 epidemic in China. The null hypothesis is that there is no difference between live online dental courses before and during COVID-19 epidemic.

## 2 | MATERIALS AND METHODS

The institutions providing live online dental courses in China during COVID-19 epidemic were searched through a web search engine. A total number of 21 dental continuing education institutions enrolled in this study. Their dental course provision was retrospectively inquired via official websites and official accounts in social software WeChat. The following public information was recorded: whether online and/or offline course was available before and during COVID-19 epidemic; if live online education was provided, the number of courses, duration and number of participants per week were further investigated. Time distributions of all live online

dental courses were recorded and classified as within working time and out of working time. The working time was defined as 8:00 AM to 6:00 PM on Monday through Friday. All the participants were anonymous; thus, no demographics were acquired. The test period of COVID-19 epidemic was for two weeks between 16 February and 29 February 2020. The control period of pre-COVID-19 epidemic was for ten weeks between 01 November 2019 and 09 January 2020.

Categorical variables are expressed as *n*. Continuous variables are expressed as median [P25, P75]. Data were analysed through SPSS Statistics, version 20.0 (IBM Corp.) using chi-squared test for categorical variables and Mann-Whitney *U* test for continuous variables. The significance level was set at 0.05.

## 3 | RESULTS

The percentages of offline and online courses provided by 21 dental continuing education institutions before COVID-19 epidemic were 95.2% (20 out of 21) and 28.6% (6 out of 21) respectively, including 23.8% (5 out of 21) institutions provided both courses simultaneously. However, all institutions suspended offline courses during COVID-19 epidemic (Table 1). There was a significant difference before and during the epidemic ( $P < .001$ ). The dental continuing education courses have been transferred from offline to online dramatically. All live online courses were lectures, with no practical training provided.

For per week before and during COVID-19 epidemic, the number of live online courses was 0.0 [0.0, 0.2] and 2.0 [2.0, 3.8] ( $P < .001$ ), the duration of live online courses (minutes) was 0.0 [0.0, 12.0] and 188.0 [105.0, 354.0] ( $P < .001$ ), and the number of participants was 0.0 [0.0, 106.5] and 7290.0 [3485.0, 14 829.0] ( $P < .001$ ), respectively (Table 2). The total number of online courses for 10 weeks before the epidemic was 33, and that for 2 weeks during the epidemic was 119 (Table 3). It was observed that live online dental continuing education increased significantly during COVID-19 epidemic. In terms of time distribution of live online dental courses retrieved in this study, the proportion of courses provided within working time raised from 6.1% (2 out of 33) of pre-COVID-19 to 46.2% (55 out of 119) during COVID-19 (Table 3). There was a significant difference between the test and control periods ( $P < .001$ ).

**TABLE 1** Overview of course types provided by 21 dental continuing education institutions (*n* (%))

Group	Offline	Online	Both offline and online
Pre-COVID-19	15 (71.4)	1 (4.8)	5 (23.8)
During COVID-19	0 (0.0)	21 (100.0)	0 (0.0)
Significance	0.000		

**TABLE 2** Weekly live online dental continuing education before and during COVID-19 epidemic (Median [P25, P75])

Group	Courses (n)	Duration (min)	Participants (n)
Pre-COVID-19	0.0 [0.0, 0.2]	0.0 [0.0, 12.0]	0.0 [0.0, 106.5]
During COVID-19	2.0 [2.0, 3.8]	188.0 [105.0, 354.0]	7290.0 [3485.0, 14 829.0]
Significance	0.000	0.000	0.000

**TABLE 3** Time distributions of live online dental courses before and during COVID-19 epidemic (n (%))

Group	Total	Within working time	Out of working time
Pre-COVID-19 <sup>a</sup>	33 (100.0)	2 (6.1)	31 (93.9)
During COVID-19 <sup>b</sup>	119 (100.0)	55 (46.2)	64 (53.8)
Significance		0.000	

<sup>a</sup>Ten weeks between 01 November 2019 and 09 January 2020.

<sup>b</sup>Two weeks between 16 February and 29 February 2020.

## 4 | DISCUSSION

This research study's aim was to assess the impact of COVID-19 epidemic on dental continuing education in China. As such, the study tested the null hypothesis that there is no difference between live online courses before and during the COVID-19 epidemic. The results indicated live online dental continuing education increased significantly during COVID-19 epidemic in China. Therefore, the null hypothesis was rejected.

Several reasons may account for the recent and sustained growth and acceptance of continuing dental education.<sup>13</sup> It is recognised that education is a key factor in economic development and social change.<sup>14</sup> In terms of dentistry, the sciences and technologies are undergoing rapid development, and therefore, the related knowledge needs to be continuously updated. The role of career-long learning is understood because of its importance in ensuring professional competency, providing optimal patient care and career advancement.<sup>15</sup> However, lack of time was the most important barrier for dentists to attend continuing education activities.<sup>9</sup> The present study showed the dentists were more involved in continuing education during the COVID-19 epidemic, which may be because they have more free time than previously.<sup>7</sup> The number of courses, duration and the number of participants increased significantly during the epidemic. Besides, as most dentists were free from clinical work,<sup>7</sup> more courses were provided within working time than before.

Nowadays, a variety of learning modes are open to dentists in the world. Distance learning activities are designed to fit the specific environment for education<sup>14</sup> and provide knowledge and skills in which geographic location separates teachers and learners. The preference for continuing education provision modes differs enormously between participants from different countries, with a preference for distance learning varying from 9% to 42%.<sup>13</sup> Studies have reported mixed results about the preference of asynchronous and

synchronous online learning and were no consensus yet.<sup>16,17</sup> Online courses have been shown to be as effective as traditional in-person education in medical education literatures.<sup>18,19</sup> And the synchronous interactive distance dental education delivery approach was as effective as traditional means.<sup>20,21</sup> The live online course offers appealing educational alternatives and provides learning opportunities for those whom a traditional on-site education setting does not work currently. These courses enable a more relaxed environment with real-time interactions amongst all participants and may be helpful to dental practitioners who do not have daily contact with other professional colleagues. The willingness of dentists to engage in live online learning suggests that this mode of education may have great potential in the future.

Distance education is different from traditional education, so several requirements are necessary for it to be successful. In this context, hardware technology, internet connection and the ability to use media are very important.<sup>14</sup> Besides objective conditions, the focus of responsibility shifts from the teacher to the pupil, and distant learners might hardly motivate themselves to stay longer on distance learning.<sup>14</sup> Therefore, distance education may be not for every learner. Consequently, to ensure successful and high standards of distance education, care is needed.<sup>14</sup> More attention should be given to the learner's needs and level of learner engagement<sup>13</sup> as interaction is a key component in distance education.<sup>17</sup>

The weakness of the current study is that the information on dental continuing education institutions and courses provided was limited. Online courses were hard to search as there was no consistency in how they were posted and the terms used by the institutions. The study assessed live online dental course availability and number of participants under a specific public health emergency but did not evaluate course completion rates or course quality. Further studies about the comprehensive state of online dental continuing education during COVID-19 epidemic are necessary.

## 5 | CONCLUSION

Within the limitations of this study, the results show that live online dental continuing education increased significantly during COVID-19 epidemic. The Chinese dentists actively used their disposable time for self-professional development whilst controlling and preventing the transmission of COVID-19.

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## CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ORCID

Xiaoqiang Liu  <https://orcid.org/0000-0002-3427-2130>

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