Are Chinese Dentists Ready for the Computerization of Dentistry? A Population Investigation of China’s Metropolises

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Abstract The authors studied current levels of computerization in dental clinics and the attitudes of dentists towards dental computerization in metropolises in China. A survey consisting of 22 questions was e-mailed or mailed to a random sample of 354 dentists. Of all respondents, 80.5% reported using a computer in their practice. The authors found that dental computerization was a benefit to patient care. The authors found that the computerization of dental clinics in Chinese metropolises is a few years behind that of western nations.

Introduction
Computers are an increasingly common feature of healthcare systems throughout the world. In addition to clinical care, computerization in clinical practice can also improve both front- and back-room administrative efficiency. In regards to dentistry, computer applications offer benefits in patient registration, admission, computer-based Patient Records (CPR), recalls and regular follow-ups, and knowledge-based clinical decision support systems.

The data from the Ministry of Health (MoH) in China, shows approximately 60,000 active dentists. Meanwhile, there is a sharp increase of graduates starting careers in dentistry. However, access to dental services in China is still low. The development of dentistry in China includes the promotion of information technology. Although the computerization of dentistry within China began in the late 1970s, development was slow until the late 1990s. In 1999, a Dental Computer Technology Board (DCTB) was established by the Chinese Stomatological Association (CSA). The MoH report “Health Care Development: The 11th Five Year Project” again highlighted the need for a better use of information technology in dentistry.

The aim of this case study was to examine dental computerization in China’s metropolises and the attitudes of dentists in these areas towards it.

Methods
The survey was pilot-tested. The questionnaire, designed by three specialists (two in dentistry and one in computer technology) at Wuhan University, was reviewed and revised by another 14 outside specialists (nine in dentistry, three in computer technology, one in survey design, and one in statistics). The final survey and the research protocol were submitted to the Institutional Review Board, Wuhan University.

Selection of Subjects
We included active dentists working in major Chinese cities (282 cities and 4 municipalities). Dentist: population ratios range between 1:25,000 to 1:9,000 in these cities and municipalities. We screened a sample of 738 dentists, two-three from each city and eight–ten from each municipality. Names were obtained from a published manual “China Dental Information 2005”, assisted by a random number table. The questionnaire, with a cover letter was e-mailed or mailed to the selected sample.

Questionnaire
The questionnaire consisted of 22 questions grouped into four categories: practice characteristics, computerization of clinical and administrative tasks, internet use, and attitudes toward computer application (please refer to online appendix).

Statistical Analysis
Frequency tables and descriptive statistics were generated for the collected data. The SPSS statistical package (SPSS for windows 13.0, SPSS Inc, Chicago; United States) was adopted and the significance level was 0.05. The differences between groups were analyzed using Pearson’s ×2-test.

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Results
Forty-eight percent of subjects (354/738 dentists) responded to the questionnaire, covering 201 cities and 4 municipalities.

Practice Characteristics
Table 1 presents the subjects’ demographic and practice information. Majority (285/354) of the sample used a computer in their practice. Only a small portion (94/354) had chair-side computers. Chair-side computers were more likely to be adopted by a Government Hospital rather than a private practice (p < 0.001).

Internet Use
Only a few computerized respondents reported having internet access in their dental offices (74/285). Fewer (40/285) had internet access from a chair-side computer. However, over half (239/354) of the respondents had their own website or Bulletin Board Service (BBS) online, for advertisement and patient education. Larger practices (generally within Government Hospitals) were more likely to have websites than private practices (p < 0.001).

Nearly one-third (23/74) of the practices with internet access used e-mail for clinical purposes. E-mail communication with colleagues was cited as the most frequent usage. Two thirds (50/74) of Internet users used online searchable bibliographic databases. MEDLINE was their first choice for international publications.

Computerization of Clinical and Administrative Tasks
Table 2 details the specific clinical and administrative tasks that subjects were asked about in the questionnaire. Contrasting clinical functions, administrative tasks were the first to be computerized in both types of practices. Less than half (115/285) of the respondents having computers in their offices used CPR in their daily practices, but the other half (140/285) wanted to have this function within two years.

Attitudes towards Computerization of Dental Practice
Table 3 details respondents’ statements and attitudes towards computers in clinical use. A majority of both CUs
(Computer-users) and NUs (Non-users) supported the statement that computerization is a benefit. In contrast, statements concerning the potential negative effect of computerization had a significantly lower level of inter-agreement between CU’s and NU’s, indicating apparently divergent cognitions on the negative impacts of computers. Meanwhile, we found that younger dentists presented more positive attitudes towards computer use (age < = 40 v. age > 40, p < 0.05), and detected no differences between specialties in dentistry (p > 0.05).

**Discussion**

We assumed that globalization and information technology had shrunk the distance between east and west. However, few reports reveal the status of dental computerization in China, which has the greatest population in the world. It is significant for dentists, informaticians, and dental IT investors to have a general picture of the progress of dental computerization in China. This case study indicates a considerable level of dental computerization in China’s metropolises.

We found that a majority of respondents had computers in their offices, while a minority used chair-side computers. Data are similar to Schleyer’s 2006 report for the United States.\(^9\) Data suggest that China, although an undeveloped country, has an equal opportunity to progress dental informatics as does the west. China’s great population seems to create a larger market for dental IT investors. This survey reveals that computerization is more likely to be adopted by Government Hospitals, probably because of financial support from government, than by private clinics. Additionally, few respondents adopt CPR or use the internet for clinical service. Thus China may implement dental computerization in ways that differ from the west. Further research concerning this topic must take many factors into consideration, including politics, economics, culture, and patients’ education levels.

In China, government hospitals receive a much higher number of patient visits than private clinics. It is urgent for them to adopt information technology to assist and streamline administrative affairs. The competitive advantage of a private practitioner lies in service delivery. Investment in technology to assist in clinical service delivery offers a great return. Differences detected between two types of practice on certain issues inform us that we must have diverse thinking in developing and applying information technology under different dental clinical environments.

Dentists’ attitudes are a decisive factor to implementing dental computerization.\(^10\) We found that Chinese dentists’ attitudes were generally positive. The negative impacts of computer use may be amplified by some nonusers, but proper instruction in computer use may reduce resistance. The enthusiastic attitudes of younger Chinese dentists anticipates a favorable future for dental computerization in China.

### References


