

Level of knowledge of dental practitioners in Isfahan, Iran about cone-beam computed tomography and digital radiography

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Dear Editor,

The selection of appropriate diagnostic techniques is an important step in the treatment of disease. An optimal diagnostic method can provide essential information, while minimizing cost and harm to patients. In dental radiography, attempts have been made to reduce patient exposure to radiation. Cone-beam computed tomography (CBCT) and digital radiography were developed to achieve this goal.

CBCT is becoming the preferred cross-sectional imaging technique for dental practitioners¹ due to its advantages, such as low cost, easy accessibility, and a low radiation dose, compared to multi-slice computed tomography.² Some of the applications of CBCT include the localization of supernumerary and impacted teeth,³ the examination of the temporomandibular joint,⁴ the detection of cysts and tumors of the jaw,⁵ the detection of root fractures,⁶ the assessment of root canal configurations,⁷ treatment planning for the placement of dental implants,⁸ and orthodontic diagnoses.⁹

Digital radiography is another widely popular radiographic modality in dental practice, with advantages including a decreased radiation dose, easy digital storage and electronic transmission, and not requiring a darkroom.¹⁰ It is necessary to determine the level of knowledge of dental practitioners about the abovementioned imaging modalities and whether both conventional and novel techniques are being used efficiently in oral and maxillofacial radiology.

We assessed the level of knowledge of dental practitioners about CBCT, digital radiography, and the correct indications for referring patients to oral and maxillofacial radiologists. A total of 110 questionnaires were distributed among dental practitioners attending continuing education courses in the city of Isfahan, Iran. The questionnaire contained 19 questions addressing the demographic characteristics of the participants, their level of knowledge about CBCT, and their knowledge about appropriate indications for referring patients for digital radiography and CBCT. Appendix 1 contains the questionnaire form, adopted from the study of Dölekoğlu et al.¹¹ The data were analyzed using SPSS version 22 (IBM Corp., Armonk, NY, USA). Eighty questionnaires were returned (response rate, 72.73 %). Of the respondents, 53.4% were male and 46.6% were female, with a mean age of 39.3 ± 7.4 years (range, 25-54 years). No significant differences were observed between males and females regarding the usage of digital radiography or CBCT ($P=0.990$ and $P=0.348$, respectively). Moreover, Fisher's exact test failed to find significant differences among dentists regarding the use of digital radiography or CBCT based on their time of graduation ($P=0.418$ and $P=0.350$, respectively). The field of practice was not significantly associated with the use of digital radiography or CBCT ($P=0.116$ and $P=0.135$, respectively). The t-test revealed no significant difference among practitioners in different age groups regarding the usage of digital radiography or CBCT ($P=0.218$ and $P=0.247$, respectively). A total of 33.7% of the respondents reported using digital radiography. Moreover, 18.8% of dental practitioners reported referring their patients for CBCT, while 46.3% of the respondents had never referred a patient for CBCT. Table 1 summarizes the reasons provided

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Table 1. Reasons for using or not using digital radiography.

Reasons for using digital radiography	%	Reasons for not using digital radiography	%
Lower radiation dose	50.0	Expensive	25.0
Short time to perform	43.8	Poor image quality	12.5
No developing process	65.6	Lack of essential equipment	55.4
No pollution	28.1	Unable to use the computer	0.0
Easy to store images	53.1	Unsure	14.3
Images can be adjusted and measured	50.0	Hard to perform	3.6
No artifacts related to the developing process	37.5	Narrow image area	5.4
		Technical problems related to archiving images	10.7

Table 2. Frequencies of different indications for cone-beam computed tomography imaging.

Indications for CBCT	%
Trauma	18.8
Cyst or tumor	37.5
Implant planning	62.5
Dental caries	0.0
Periodontal diseases	2.1

by the practitioners for using or not using digital radiography. As shown, the most important reason for using digital radiography among dentists is that it eliminates the conventional film developing process. However, 55.4% of the practitioners did not use digital radiography due to lack of the necessary tools. Table 2 demonstrates the frequency of different indications for using CBCT. As shown, the most frequent indication for using CBCT is planning implant placement. Since the use of implants is currently growing very quickly, we can expect that CBCT will soon be used increasingly frequently in our country.

We found that dental practitioners in the city of Isfahan mostly used conventional radiography, despite their acceptable knowledge about the benefits of digital radiography. The high cost of equipment seems to be the main obstacle in this regard. Moreover, despite an acceptable level of knowledge about the benefits of CBCT, the participants rarely referred their patients for this imaging modality. Only five centers in our city currently possess CBCT equipment. This may indicate that it is necessary to equip more oral and maxillofacial radiology centers in our city with CBCT systems.

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Appendix 1. Questionnaire form.

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1. Age: 2. Gender:
3. Student () General practitioner () Public dentist () Researcher ()
4. Location: 5. Year of graduation:
6. Do you use digital imaging techniques in your clinic?
 (a) () Yes (b) () No

If you answered no to question 6, please go to question 11

7. For which kind(s) of radiography do you use digital imaging?
 (a) () Panoramic (b) () Intraoral (periapical, etc.) (c) () Cephalometric (d) () All
8. Please check your reasons for using digital imaging techniques:
 (a) () The radiation dose is much lower. (b) () It takes a short time to perform.
 (c) () There is no developing process. (d) () There is no wastage in the developing process and it does not cause pollution.
 (e) () It is easy to store images. (f) () Adjustments and measurements can be performed on images.
 (g) () There are no artifacts related to the developing process.
9. Are you satisfied with digital imaging?
 (a) () Not at all (b) () A little (c) () Unsure (d) () Satisfied (e) () Very satisfied
10. Does the usage of digital imaging increase the frequency of retaking radiography?
 (a) () Yes (b) () No
11. Please check your reasons for not using digital imaging techniques:
 (a) () Expensive (b) () Poor image quality (c) () I do not have essential equipment.
 (d) () I do not know how to use the computer. (e) () Unsure (f) () Hard to perform
 (g) () The image area is too narrow. (h) () Some technical problems might occur during the storage of images.
12. Which technique do you prefer when you need three-dimensional imaging of the neck and head region?
 (a) () Computerized tomography (CT)
 (b) () Dental volumetric tomography (DVT)/cone-beam computed tomography (CBCT)
13. Have you ever heard of CBCT/DVT?
 (a) () Yes (b) () No

If you answered no to question 13, please go to question 17

14. Have you ever referred your patients for CBCT imaging?
 (a) () Yes (b) () No
15. In which situations do you prefer CBCT imaging?
 (a) () Trauma (b) () Cyst or tumor (c) () Implant planning (d) () Dental caries (e) () Periodontal diseases
16. What is the difference between CT and CBCT?
 (a) () The radiation dose of CBCT is lower than that of CT. (b) () The radiation dose of CBCT is the same as that of CT.
 (c) () The radiation dose of CBCT is higher than that of CT.
17. How long is your exposure time for intraoral digital radiography?
 (a) Anterior teeth seconds (b) Posterior teeth seconds
 (c) () I do not know. (d) () I do not make any adjustments.
18. Do you have periodic checks and calibrations of your radiography equipment?
 (a) () Yes (b) () No
19. Do you frequently attend seminars and meetings about radiology?
 (a) () Yes (b) () No
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