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Dental Teleradiology: A Powerful Strategy to Overcome the Impact of COVID-19

From:

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Coronavirus Disease (COVID-19) has become a world-wide pandemic. As of July 25, 2020, 15,822,814 cases of COVID-19 have been confirmed, with 641,273 deaths (<https://coronavirus.jhu.edu/map.html>). Since transmission occurs mainly through respiratory droplets, social distancing is recommended to stop the progression of the disease. This has dramatically impacted the dental field worldwide because of the direct contact of the professional with the patient's saliva and blood during treatment (1).

In oral radiology, several guidelines have been published to better instruct professionals on patient care. One of the most frequent recommendations is that preference should be given to extraoral radiographs when a radiographic examination is needed, such as panoramic radiography and cone-beam computed tomography (2,3). However, depending on the patient's indication and condition, intraoral radiography may be unavoidable and some recommendations should be followed to avoid contamination by COVID-19 (2,3). When there is a clear indication for radiographic examinations, film-based or printed copies should be avoided as they are potential sources of transmission (3). In addition, hard copies cannot be easily sent to distant locations. For instance, if interpretation assistance is needed, the involved professionals would have to put themselves at risk, which could have been avoided with the use of digital images. Oral radiologists can work from home and assist clinicians without the risk of contamination. Thus, such practice should be encouraged.

With this home-office possibility, concerns may arise regarding the compression of the images (eg, TIFF and JPEG) that can occur due to online transmission, quality of the computer displays, and ambient light conditions for interpretation of the images. TIFF and JPEG formats are the most commonly used for radiographic images; TIFF file format is free of compression and, therefore, larger than JPEG.

Conversely, JPEG is a file format subjected to different compression patterns, which can occur in a smaller or larger scale (4). Despite this difference, a previous study showed that the compression from TIFF to JPEG (at medium and small file sizes) does not influence the radiographic diagnosis of root fractures (4). Monitors used in radiology for diagnosis should have a good overall grayscale presentation and a high luminance profile. This is especially important for the detection of subtle radiolucencies or radiopacities, such as in the detection of caries and periapical lesions (5). Despite these recommendations, a recent study evaluated the influence of different computer displays, horizontal viewing angles, and ambient lighting conditions in the diagnosis of non-cavitated proximal caries lesions and revealed that none of these factors influenced this diagnostic task (6).

To evaluate cone-beam computed tomography images, there are numerous open-source software applications that process DICOM images (7). There are also software applications developed for each specific device such as CS 3D Imaging (Carestream Health Inc., Rochester, NY), Xoran CT (i-CAT Next Generation unit, Xoran Technologies, Ann Arbor, MI), i-Dixel (Accuitomo unit, J Morita MFG Corp., Kyoto, Japan), and Ez3D Plus (Picasso Trio unit, E-WOO Technology, Giheung-gu, Republic of Korea). These software applications can be compatible with Windows (Microsoft Corporation, Redmond, WA), Macintosh (Apple, Cupertino, CA), or both operating systems and have their own specifications.

Another option that allows the radiologist to work from home is by accessing the images remotely using platforms such as AnyDesk (www.anydesk.com) and TeamViewer (www.teamviewer.com). These tools are compatible with computer operating systems of various brands and allow the user of one computer to take complete control of another computer via the Internet, thus being able to completely handle the software on the accessed computer. Picture Archiving and Communication System is another tool via the Internet, which allows for distribution, storage, analysis, and digital processing of radiographic images. In all of these systems, the oral radiologist is able to access the images remotely and, then, possibly reach the diagnosis quickly. However, for such cases, stable and high-speed Internet connection is essential.

A quick search of the main scientific databases revealed recent studies in oral radiology still using film-based radiographic images. Thus, in some parts of the world, analogue films are still a reality, and reinforces the importance of financial planning to be able to shift into the digital era. With the advances of recent years in the field of oral radiology, being fully digital may never have been as important as it is currently. In order to avoid unnecessary contact with patients and decrease the exposure to COVID-19, dentists will need to optimize their work by reducing the duration of treatment sessions and the need for return visits. Oral radiologists must be readily available to provide an accurate diagnosis that allows the clinician to perform efficiently.

In conclusion, the use of teleradiology is strongly encouraged to accomplish social distancing in this pandemic. However, the professional must be aware of the responsibilities involved to offer an adequate diagnosis to patients. Considering the complexity of image-based diagnosis, dentists and radiologists should seek advanced training and refer to more experienced colleagues. Several tools can be used so that no information is lost in this process.

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