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Rapid radiology training for junior dental students during the COVID-19 pandemic

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1 | PROBLEM

At Penn Dental Medicine (PDM), clinical radiology training is designed to ensure competency in radiographic positioning techniques. Cancellation of Dental X-ray Teaching and Training Replica (DXTTR) "boot camps" for rising D3 students due to the COVID-19 pandemic disrupted hands-on training and transition to radiology clinics. The problem was how to rapidly train the students[1] in intraoral radiographic techniques.

2 | SOLUTION

Prior to phased resumption of clinical operations at PDM in July 2020, D3 students completed a 2-hour "Introduction to Radiology Clinics" virtual lecture via Canvas[2] (Instructure, Salt Lake City, UT), which included demonstration of intraoral positioning techniques and review of principles of radiation physics, biology, and protection. Students were required to pass a summative examination conducted via Examsoft. Students in the Class of 2022 were given individualized instruction in Axium (Henry Schein, Inc., Melville, NY), MiPACS software (Medicor Imaging, Charlotte, NC), and intraoral position using RINN XCP instrumentation (Dentsply-Sirona company, Charlotte, NC) (Figure 1) and several direct acquisition digital intraoral imaging systems when clinical operations resumed.

DXTTR-based radiographic training sessions that began on July 7 continued until October 1, 2020. Each hour-long
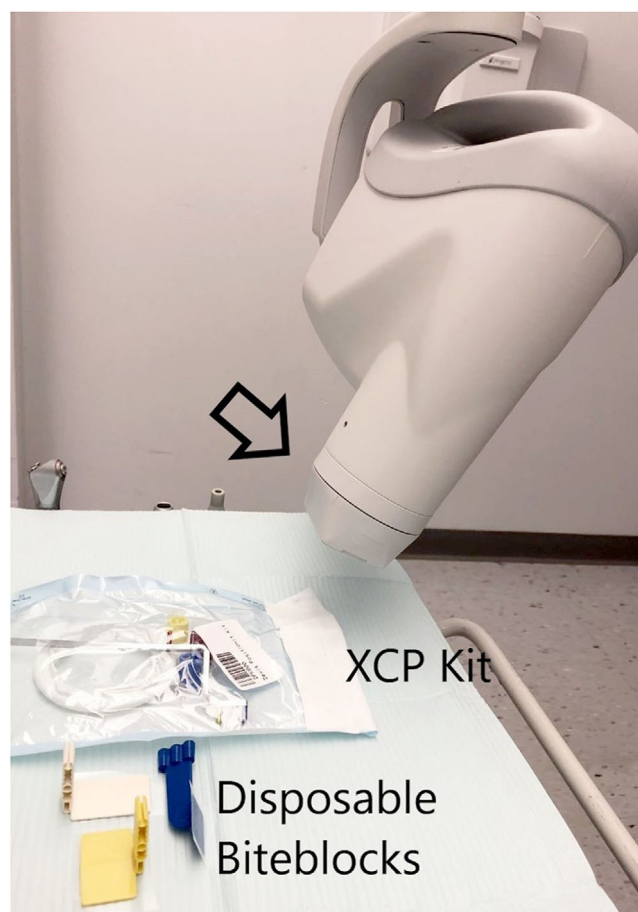

FIGURE 1 A typical intraoral X-ray machine (Progeny, Midmark company, Dayton, OH) used for training students. Note the rectangular collimation for patient safety [arrow], XCP aligning instruments and disposable bite blocks
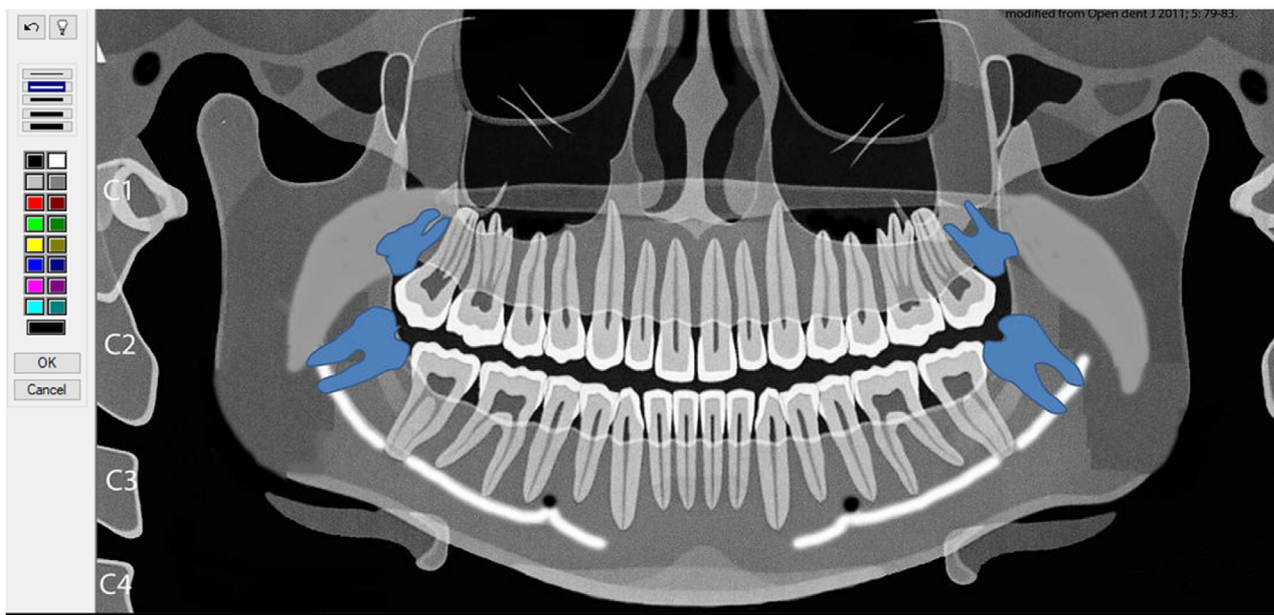
FIGURE 2 RADCON form developed using Axium Electronic health record (EHR) software

training session included a radiographic study of 18 images using a CCD sensor. Students received training in recording radiographic findings using a templated interpretation form (RADCON) (Figure 2), which prompted students to input data regarding caries, crestal bone levels, marginal, and apical periodontium.

Concurrently, 11 operatories were used for training with appropriate COVID-19 specific personal protective equipment (PPE) and strict adherence to infection control protocol. Training was given for Axium and MiPACS software usage, XCP instrumentation, and digital intraoral sensors. Additionally, instruction in Centers for Disease

TABLE 1 DXTTR training and re-exposure rates for D3 students. Table shows the type of radiographic procedure done, studies sampled, total number of radiographs, the number of re-exposures needed for acceptability of the study and the average re-exposure rate (%)

Type of radiographic procedure on DXTTR/patient	Number of studies sampled	Total number of prescribed radiographs in the studies sampled	Number of re-exposures needed to complete the study	Re-exposure rate (%)
DXTTR-FMX	162 (BWs included)	2916 (162 × 18)	810	27.7
DXTTR-BW	162	648 (162 × 4)	170	26.2
chairside-FMX	59 (BWs included)	1062 (59 × 18)	472	44.4
chairside -BW	59	236 (59 × 4)	65	27.5

Control and Prevention (CDC)-mandated disinfection protocols prepatient and postpatient care was under the guidance of 2 faculty members with support by 3 dental assistants. The hybrid program is designed to prepare the D3 students for clinical activities[1] without compromising the quality of dental care.

3 | RESULTS

One hundred and sixty-two D3 students completed DXTTR Radiology training between July 7, 2020 and October 1, 2020 and during the same period, 59 students attended the chairside training with assigned patients for intraoral radiographic acquisition. Chairside exposure data were collected as part of radiology quality assurance (QA) protocol, which tracks the numbers of exposures in axiUm software using Radiology CDT code D0210. All students had prior knowledge of XCP assembly, radiation hygiene, disinfection protocols, appropriate use of PPE in a radiology setting and exposure parameters.

In the DXTTR FMX sessions, the average re-exposures were ≈5 per student, resulting in average re-exposure rate of ≈27.7%. No direct comparison could be made with prior years as this individualized training program is unique to this year. The overall re-exposure rate among students in the chair-side clinical sessions was 44% (average 8 additional re-exposures per FMX). Bitewing examinations had a re-exposure rate of ≈26.2% in DXTTR and 27.5% in clinical groups (Table 1) with premolar BWs being the most commonly reacquired.

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