

Title: Handheld, Portable X-Ray Unit Feasibility in a Dental School Clinic

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Abstract

Objectives To test three handheld, portable x-ray units and one, conventional wall-mounted unit for image contrast, sharpness, and safety in a dental school clinic environment. **Methods** 10 third year dental students took five standardized views using DXTTR. The handheld, portable units, NOMAD Classic (NC), NOMAD Pro 2 (NP), and MaxRay (M), were provided by the respective manufacturers and set according to the users' manuals. The control was the Focus wall-mounted unit (F). New phosphor plates (Air Techniques) were used for each device and were processed in the same scanner. The images were viewed and scored in a blind manner by three experienced faculty using a 3-point system (2=excellent, 1=fair/clinically adequate, and 0=poor/not clinically acceptable) for two criteria: brightness/contrast and sharpness/definition. Each unit's safety was assessed by placing a radiation dosimeter on the operator's chest and by ion chambers strategically positioned to simulate the radiation dose in nearby proximities. The data were analyzed by one-way ANOVA followed by Student's t-Test. The statistical significant difference was set at a p value less than 0.05.

Results

	F	M	NC	NP
Contrast	1.78±0.46	1.69±0.49	1.67±0.50	1.52±0.63
Sharpness	1.55±0.56	1.21±0.63	1.07±0.65	0.93±0.69

Focus performed significantly better than the handhelds, especially in sharpness/definition. Among the handhelds, M performed similarly as NC, and both were significantly better than NP. The maximum radiation dosimeter for the students was 0.040mSv deep dose equivalent, which is well below established annual occupational dose limits. The ion chamber measurements were estimated to be less than the U.S./international annual general public limit of 1mSv.

Conclusions All handhelds were considered to be clinically acceptable. M and NC performed similarly and significantly better than NP. The operator

dose is anticipated to be well below the annual occupational dose limits and the nearby occupant's dose was estimated to be less than the annual limit.

Keywords: handheld, portable, x-ray