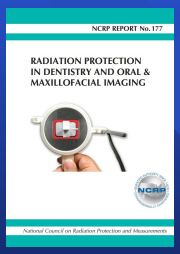
National Council on Radiation Protection and Measurements

Radiation Protection in Dentistry and Oral & Maxillofacial Imaging



NCRP Report 177 (2019)
Supersedes NCRP Report 145 (2003)

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New in NCRP 177

- Cone-Beam Computed Tomography (CBCT)
- Digital Imaging
- Handheld Dental Imaging
- 62 Recommendations

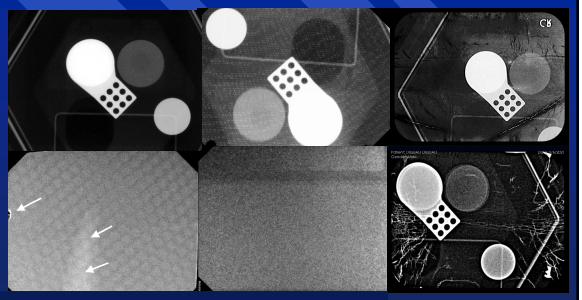
Qualified Expert

- Layout, shielding design, and verification
- Implementation of QC program
- Acceptance testing
- Radiation protection survey and equipment performance evaluation (EPE)
- EPEs at regular intervals

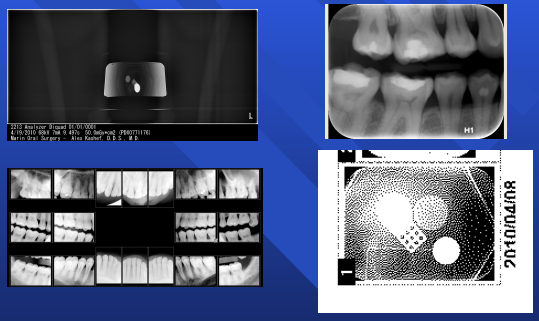
QC Intervals

- Each dental facility should record and track indicators of patient dose, such as entrance air kerma and associated technique factors
- X-Ray machine performance—not to exceed every 4 years. Metrics representing patient dose to be measured 2 years following EPE
- CBCT– every two years, preferably annually

Digital Image Quality



These are supposed to be Analyzer Test Images



Patient Doses

- Diagnostic reference levels (DRLs)
- Achievable doses (ADs)
- Fluoroscopy *shall not* be used for static imaging
- Image receptors of speeds slower than Speed Group E-F *shall not* be used
- For intraoral– kilovoltage *shall not* be < 60 kVp and *should not* be > 80 kVp
- Thyroid shields for all intraoral when it will not interfere with the examination

Employee Doses

- Students or candidates for licensure *shall not* perform x-ray exposures of humans
- Personal dosimeters *should* be provided for any employee likely to receive in excess of 1 mSv/year
- Personal dosimeters *shall* be provided for pregnant employees
- For new or relocated equipment employees should be provided with personal dosimeters for one year

Employee Doses

- Employees using handheld equipment *should* be provided personal dosimeters for one year
- Employees *should not* routinely restrain patients and *shall not* hold the image receptor

Cone-Beam Computed Tomography (CBCT)

- CBCT *shall* use the smallest field-of-view and lowest technique factors that provide the lowest dose commensurate with the clinical purpose
- CBCT *shall not* be used for the purpose of producing simulated bitewing, panoramic or ceph images.

CBCT Recommendations

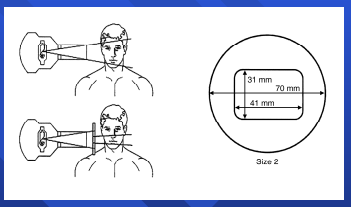
- CBCT examinations *shall not* be used as the primary or initial imaging modality when a lower dose alternative is adequate for the clinical purpose and *shall not* be used for routine or serial orthodontic imaging
- CBCT *should* be used for cross-sectional imaging as an alternative to conventional CT when CBCT dose is lower

Suggested Bitewing Entrance Doses

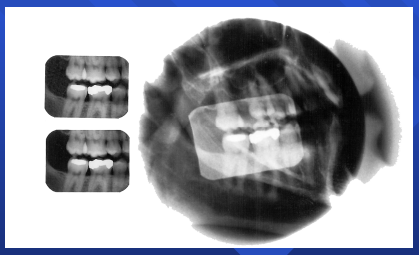
Detector Type	Suggested Entrance Dose (mGy)
D-Speed Film	1.52–1.95
E-F- or F-Speed Film	0.87-1.09
Digital-PSP	0.52-1.04
Digital CMOS	0.44-0.87
Digital CCD	0.35-0.52

Rectangular Collimation *Shall* Be Used for Periapical and Bitewing Radiography

Exposed area three times greater with round collimation versus rectangular collimation.



Most Radiation Passes Through The Patient

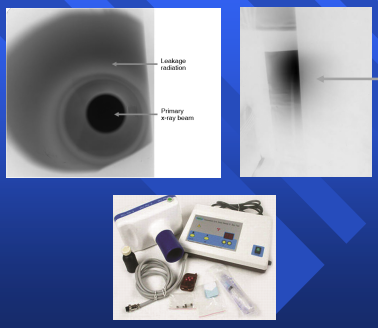


Handheld Shielding

Operators of FDA-approved handheld x-ray units *shall not* be required to wear personal radiation protective garments

Assure Handheld Units Are FDA Cleared

Handheld Leakage Radiation



Summary

- Selection criteria (have a good reason for acquiring the image)
- Fastest available image receptor
- Optimized exposure technical factors
- Rectangular collimation with intraoral imaging
- Thyroid shielding for all intraoral imaging and other examinations as appropriate

Summary

- Smallest FOV and lowest exposure techniques commensurate with the diagnostic task in CBCT
- Continuous QC programs for equipment, techniques, film processing, and image receptors
- Up-to-date training for all personnel

Similar Presentations:
CRCPD 2021 53rd National Conference on Radiation Control, May 17-21, 2021
AAPM 2021 63rd Annual Meeting and Exhibition, July 25-29, 2021