

FDI POLICY STATEMENT

Radiation Safety in Dentistry

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CONTEXT

Dental radiology is a discipline that has undergone significant changes. This is intrinsically linked to digitalization and the emergence of new systems, such as Cone Beam Computed Tomography (CBCT), as well as to the indications for their use. Given the risks posed by any radiation source and the cumulative effects of radiation, it is important to review the rules governing radiation safety in dentistry.

SCOPE

This policy statement provides a foundation for the fundamental concepts in radiology that practitioners and dental teams need to understand for their diagnostic clinical practice, including radiation levels based on the equipment used, indications, and protective measures for patients.

DEFINITIONS¹

Effective dose. It is the tissue-weighted sum of the equivalent doses in all specified tissues and organs of the human body. It is expressed in millisieverts (mSv).

Radiation risk. The potential harm posed by exposure to radiation. In risk assessment, risk is a combination of the probability of damage or injury occurring and its severity.

PRINCIPLES

The basic principles of regulations on radiation safety in dentistry include:

Justification. The radiograph should be obtained when a patient is likely to benefit from diagnostic imaging, and the benefit outweighs the risk of ionizing radiation exposure. An initial clinical examination is required to determine the need and type of images necessary for evidence-based diagnosis and treatment planning².

Optimization. The likelihood of exposure and the magnitude of individual doses should be kept as low as reasonably achievable (ALARA), provided they deliver an image of acceptable diagnostic quality for the clinical indication¹.

Dose limitation. Exposure should not exceed the dose limits recommended by the International Commission on Radiological Protection (ICRP) and/or national regulations over a specific period³.

POLICY

In the context of radiological safety in dentistry and minimizing radiation exposure, the FDI recommends implementing the following measures³:

- **Image receptor.** Using digital sensors or high-speed films (E- or F-speed) substantially reduces the radiation dose per acquired image. D-speed films should not be used for intraoral imaging.
- **Beam collimator.** For intraoral radiographs, limit the beam diameter to 6 or 7 cm or less at the patient's face, and use a film/receptor holder and rectangular collimation if possible.
- **Exposure.** For intraoral radiographs, preferably use 60–70 kVp to optimize contrast and reduce depth dose. Reduce exposure time and/or mA when applicable. Use machines with automatic exposure controls when available. If not, use technique charts or other appropriate means to minimize over- or underexposures. Particular attention should be paid to children and pregnant patients, as they are substantially more susceptible to radiation risk.
- **Operator Protection.** Operators should stand outside the primary beam, at least 2 meters from the source, and behind a protective barrier whenever possible. When barrier protection or shielding is not available for intraoral imaging, the operator shall stand at least 2 meters from the tube head and out of the primary beam path. If distance measures cannot be implemented, the use of personal dosimetry is necessary.
- **Hand-held units.** Such units should be stored in a locked facility when not in use to prevent unauthorized access. The unit should be equipped with a backscatter shield, and, depending on the radiation risk analysis, personal radiation dose monitoring is recommended. It is desirable to use it on a fixed-mounted unit and control it remotely.⁴
- **CBCT.** When indicated and when lower-dose techniques are not sufficient, use the smallest field of view needed to answer the clinical question and dose-minimizing procedures. CBCT examinations should not be used routinely or for screening.
- **Patient shielding.** Radioprotective shields are generally not needed if the recommended principles and techniques are followed, such as using rectangular collimation, digital sensors, proper radiographic techniques, and maintaining equipment quality control. However, if these standards are not met or if a patient has specific medical needs, the use of shields is advisable.
- **Quality control.** Protocols should be developed and followed to assess the integrity of the radiation generator, image processing device, and system. Follow the manufacturer's documentation for safe and proper operation, maintenance, and infection control.
- **Education and training.** People operating radiation devices must have appropriate updated training, education, and certification.

KEYWORDS

CBCT, Dental radiograph, Radiation, Safety.

DISCLAIMER

The information in this Policy Statement was based on the best scientific evidence available at the time. It may be interpreted to reflect prevailing cultural sensitivities and socioeconomic constraints. National and local regulations, as well as available resources, should be taken into account.

REFERENCES

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