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FDI POLICY STATEMENT

Radiation Safety in Dentistry

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3 **CONTEXT**

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

9

10 **SCOPE**

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

15

16 **DEFINITIONS¹**

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

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

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23 **PRINCIPLES**

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

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

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

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

35

36 **POLICY**

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

- 39 • **Image receptor.** Using digital sensors or high-speed films (E- or F-speed)
40 substantially reduces the radiation dose per acquired image. D-speed films should
41 not be used for intraoral imaging.
 - 42 • **Beam collimator.** For intraoral radiographs, limit the beam diameter to 6 or 7 cm
43 or less at the patient's face, and use a film/receptor holder and rectangular
44 collimation if possible.
 - 45 • **Exposure.** For intraoral radiographs, preferably use 60–70 kVp to optimize
46 contrast and reduce depth dose. Reduce exposure time and/or mA when
47 applicable. Use machines with automatic exposure controls when available. If not,
48 use technique charts or other appropriate means to minimize over- or
49 underexposures. Particular attention should be paid to children and pregnant
50 patients, as they are substantially more susceptible to radiation risk.
 - 51 • **Operator Protection.** Operators should stand outside the primary beam, at least
52 2 meters from the source, and behind a protective barrier whenever possible.
53 When barrier protection or shielding is not available for intraoral imaging, the
54 operator shall stand at least 2 meters from the tube head and out of the primary
55 beam path. If distance measures cannot be implemented, the use of personal
56 dosimetry is necessary.
 - 57 • **Hand-held units.** Such units should be stored in a locked facility when not in use
58 to prevent unauthorized access. The unit should be equipped with a backscatter
59 shield, and, depending on the radiation risk analysis, personal radiation dose
60 monitoring is recommended. It is desirable to use it on a fixed-mounted unit and
61 control it remotely.⁴
 - 62 • **CBCT.** When indicated and when lower-dose techniques are not sufficient, use
63 the smallest field of view needed to answer the clinical question and dose-
64 minimizing procedures. CBCT examinations should not be used routinely or for
65 screening.
 - 66 • **Patient shielding.** Radioprotective shields are generally not needed if the
67 recommended principles and techniques are followed, such as using rectangular
68 collimation, digital sensors, proper radiographic techniques, and maintaining
69 equipment quality control. However, if these standards are not met or if a patient
70 has specific medical needs, the use of shields is advisable.
 - 71 • **Quality control.** Protocols should be developed and followed to assess the
72 integrity of the radiation generator, image processing device, and system. Follow
73 the manufacturer's documentation for safe and proper operation, maintenance,
74 and infection control.
 - 75 • **Education and training.** People operating radiation devices must have
76 appropriate updated training, education, and certification.
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78 **KEYWORDS**

79 CBCT, Dental radiograph, Radiation, Safety.

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81 **DISCLAIMER**

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

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