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REGULATIONS AND STANDARDS FOR IQRL AND DRL AND BEST PRACTICES

Implementation of international, governmental, and provincial standards and protocols is the best approach to compare performance in an office with statistics gathered from different offices in various places. The implementation and regulation of these standards are now being overseen by the IAEA. Each local government has the responsibility to ensure the standards are set for their country. DRLs should be set for representative examinations or procedures performed in the local area, country or region where they are applied. National DRLs (NDRLs) should be set on the basis of wide scale surveys of the median doses representing typical practice for a patient group (e.g. adults or children of different sizes) at a range of representative healthcare facilities for a specific type of examination or procedure. NDRLs are commonly set at the third quartile values (the values that splits off the highest 25% of data from the remaining 75%) of these national distributions.

“Which dose quantities are used for setting DRLs?” For dental intraoral radiography, the recommended quantity is incident air kerma, measured in mGy. IAEA requires radiation expressed in mGy, and DRL and DAL are given in mGy, and not in mSv, which is theoretical number value, and used in many Offices to estimate radiation risks.

NCRP (USA) dose standards, regulations: Statement from NCRP No. 172, NCRP in USA recommends an achievable dose DAL of 1.2 mGy for intraoral single bitewing radiography. This is the median dose for E-F film in the Michigan survey and is higher than for digital systems.

The optimization of patient protection in diagnostic radiology, requires the application of examination-specific protocols tailored to patient age or size, region of imaging and clinical indication in order to ensure that patient doses are as low as reasonably achievable for the clinical purpose of the examination. Diagnostic reference levels (DRLs) are a practical tool to promote optimization. It is important to recognize that DRLs are a useful tool but only the one step in the overall process of optimization.

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Example: (Adopted from Dr. J. Gray) Concern about x-ray doses is significant for full-mouth surveys since the skin dose for these are similar to doses from CT head scans. Full mouth survey with 20 images will result in a dose of 20 x 1.2 = 24 mGy, similar to a CT head scan

If four bitewings are taken annually from age 10 to age 70, the patient receives a lifetime entrance does of 48 rad. 60 x 4 x 24 = 5760 mGy or 6 Gy.

Now, in what follows, is not a trick question. It uses IAEA's definition of radiation (as absorbed dose to organ in mGrays). The use of Equivalent Radiation Dose in mSieverts (in mSv) is not accepted by IAEA as it is a theoretical quantity and it depends on mathematical models used. (I have published several scientific paper where some decisions were based on theoretical approach, using some assumptions and stated conclusion if the model is correct).

In addition to acceptable radiation dose to patients, one had to produce diagnostic quality images. To obtain good images we recommend the visual grading analysis (VGA) method used on clinical and on professional images.

The visual grading analysis (VGA) method is another objective means for the inter-comparison of phantom images. When applied to the dental phantom images the same protocol is used to make diagnostic findings from patient clinical images. These standard values are applicable regardless of the type of imaging: film, charge-coupled device, or complementary metal oxide semiconductor digital systems. In the clinical use of the dental x-ray unit, it is impossible to ensure that the quality of the images remains satisfactory with the passage of time without using the IQ(R) protocol.

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