Radiation Fact Sheet

Are Dental X Rays "Safe"?

What x-ray dose should be used for patients?

X-ray doses are relatively low for a *single intraoral bitewing radiograph*. This assumes that the x-ray equipment is properly maintained, radiation doses are measured, equipment is calibrated periodically [annually or biennially (every two years)], and that film processing is carried out according to the film manufacturer's recommendations.

Concern about x-ray doses is significant for full-mouth surveys since the skin dose is similar to doses from CT head scans. This was emphasized by Brenner DJ and Hall EJ, and Brenner DJ, et al. in the *New England Journal of Medicine* and *AJR*. While a single bitewing results in a patient entrance dose of about 200 mrad a full mouth survey with 20 images will result in a skin dose of 4,000 mrad similar to a CT head scan. If four bitewings are taken annually from age 10 to age 70, the patient receives a lifetime entrance dose of 48,000 mrad, a significant radiation dose.

Also of concern is that dental x-ray imaging may start at a young age, when patients are more susceptible to cancer induction. Brenner, et al., estimate that the risk for a pediatric patient may be 10 times higher than for an adult. A pediatric patient has a long lifetime ahead, thereby leaving more time for radiation induced cancer to develop. In addition, dental x rays are often taken more frequently than CT scans, e.g., annually.

X-ray doses are relatively safe but it is essential to know what radiation doses are used, to minimize that patient dose, and to maximize the image quality!

See our FAQs at www.DIQUAD.com for more information on x-ray dose to you, your patients, and your staff.

References

Brenner DJ, Hall EJ. Computed Tomography — An Increasing Source of Radiation Exposure. New England Journal of Medicine, 357:2277-2284, 2007. (http://content.nejm.org/cgi/content/full/357/22/2277)

Brenner DJ, et al. Estimated Risks of Radiation-Induced Fatal Cancer from Pediatric CT. American Journal of Roentgenology (AJR), 176:289-296, 2001 (http://www.ajronline.org/cgi/content/full/176/2/289)

Why are patient and staff radiation doses important?

It is important to minimize the radiation dose received by patients while assuring optimum quality of the radiographic images. Whenever the dose to the patients is reduced there is a similar reduction in the dose to the staff. For example, changing from D- to E-speed film will result in a 40% reduction in radiation dose to the patients ***and the staff***.

Are dental x-ray doses safe for patients?

Any radiation dose, no matter how low, is believed to have the potential of causing cancer. The radiation dose from a single intraoral image is relatively low. However, it is important to assure that the radiation doses to patients (and staff) are ALARA (as low as reasonably achievable) so that any potential risk from the x-ray dose is minimized.

Why are there concerns about dental radiation doses?

A single bitewing image results in a patient entrance dose of about 200 mrad* while a full mouth survey with 20 images will result in a entrance dose of 4,000 mrad, similar to a CT head scan. If four bitewings are taken annually from age 10 to age 70, the patient receives a lifetime entrance dose of 48,000 mrad, a significant radiation dose.

*The entrance dose for a chest x-ray is about 15 mrad and for head CT is about 5,000 mrad .

Are digital dental x-ray doses lower than film doses?

Digital dental radiography uses x rays the same as film imaging and also results in x-ray dose to your patients and staff. Digital radiography offers the *potential* for significant reductions in x-ray dose. However, it has been our experience that about 26% of the offices that switch to digital dental are using doses similar to or higher than D-speed film! In addition, 47% of facilities are using doses for digital imaging that are higher than necessary.

D-speed film requires a dose of about 150 to 200 mrad. Digital radiography doses should be on the order of 50 to 100 mrad, a reduction in dose of 60 to 75%. (Digital radiography with photostimulable phosphor [PSP] plates may not result in as significant a reduction in dose as with DR using CCD or CMOS sensors.)

How do I know if my doses have been reduced appropriately when I switched to digital dental x-rays?

You should have your present doses measured, a service provided by DIQUAD through your state radiation protection agency, or at http://diquad.com/Buy%20Online.html. Your present exposure time should be about 25% to 45% of the exposure time you were using with D-speed film. For example, if your exposure time was 300 msec (0.3 sec) for D-speed film you should be using about 75 to 120 msec (0.075 to 0.12 sec) for digital imaging. If you were using E-speed film and an exposure time of about 200 msec (0.2 sec), your digital exposure times should also be about 75 to 120 msec (0.075 to 0.12 sec).

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