ALARA = ALARming: it’s time to rehabilitate dentistry

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Ask any recent dental school graduate what the acronym ALARA stands for, and she or he is sure to know. Ask most practicing dentists with a bit of unwarranted girth around their waists and graying at the temples, and they will most likely be uncertain. ALARA is cryptic for “As Low As Reasonably Achievable.” When applied, the ALARA principle mandates that exposure to dental radiation should be at the lowest level possible to obtain the information necessary to diagnose and/or treat a patient. Is ALARA one of those hot topics that comes and goes if you wait long enough? Is it an issue to be concerned about, or is it one more thing to tuck away in our memory banks hoping it will go underground and attention need only be paid to it when outside forces make it too hard to ignore?

ALARA is here to stay. Bison the legislative books of nearly all states in the United States. It is embraced as protocol by the European Dental Community as well as part of Radiation Protection Codes of Canada and taught in every US dental school. And as ubiquitous as the ALARA principle is in organized and academic dentistry, its doctrine is not widely practiced or seemingly enforced by any state or national regulatory agency.

Does non-enforcement diminish ALARA’s importance? Only in application, not in concept—and therein lies the rub. While dentistry has concerned itself with major issues over the years such as fluoride, OSHA, cavity reduction, systemic links to endodontal disease, proper disposal of chemicals, and lately the complications of bisphosphonates, to name a few, there has been little or no effort at the grass roots or public level for dentists to incorporate and practice radiation hygiene. Yes, there are the lead shields, and yes, there are the thyroid collars. And we use radiation badges for our staff, reduce scatter radiation with improved X-ray heads, and get our machines periodically tested. But is that enough?

Consider the following: No less than authority like Gordon J. Christensen, DDS, in JADA vol 151, Number 10, 1437–1450, 2004, “Why Switch to Digital Radiography,” cited the many valuable benefits of switching from conventional dental film to intraoral digital sensors, not the least of which was the X-ray reduction of up to 80 per cent. Naturally, digital radiography applies the ALARA principle. Yet, in the “Wall Street Journal,” Rhonda L. Rundle wrote about the “Shifts to Digital Systems Cuts Discomfort and Wait times…” Nov. 29, 2005, stating that according to the most recent data from dental manufacturers, 15–25 per cent of dentists used digital radiography. That was more than 50 months ago. Maybe the number has increased to 50 per cent, if that much. The question needs to be asked, why haven’t the other 70 per cent or more converted their dental practices to digital radiography since it was first introduced in the early 1990s?

While an obvious answer is related to the cost of converting to digital, when does the greater good supersede the return on investment? When do ethics and doing the right thing kick in? And if radiation hygiene is so important—and all the experts agree it is due to the potential of irreversible cell death—why doesn’t the government intervene with tax breaks to soften the financial blow so all dentists can provide what should be a mandated policy for the public’s greater good?

ALARA applies to 2-D and 3-D imaging. So, regardless of the application of the ALARA principle can be applied when comparing the radiation from a medical CT scanning machine to that of a dental cone beam scanner. Figure 1 highlights the effective dose in microSieverts of radiation of a panoramic relative low radiation by these two CRCT manufacturers that yield accurate 3-D imaging for implant insertion, removal of impacted third molars close to the alveolar nerve, and so many more clinical applications when compared to medical CT machines.

The telling numbers are at the bottom of the chart compiled by the ICRP—the International Commission for Radiological Protection. Patients requiring both a mandibular and maxillary CT scan taken on a medical scanner are exposed to the equivalent radiation of 265 panoramic images. With so many cone beam 3-D dental scanners abounding, is it reasonable to continue to send patients to medical radiological offices for 3-D imaging? Not when the principles of ALARA are applied. Isn’t it time the state boards of health and licensure, plus national governmental agencies, institute measures to reduce this unnecessary health risk to the public if dental colleagues remain entrenched in mindsets from another era?

While the scope of this article focuses on the profession’s need to outwardly embrace the principles of ALARA, it is critical for dentists to understand the benefits of cone beam 3-D CT scanners when compared to medical machines.

Medical CT machines can only take one dental arch at a time. They do, however, have greater contrast as a result of the increased radiation. Dental cone beam 3-D CT scanners, on the other hand, are more accurate because they take the entire “volume” of data in the field without gaps of missing data points due to the spiral helixes of medical CT machines, real arches at the same time, use exponentially less radiation, and have less noise as a result of a “softer” X-ray.