

Discontinuing the Use of Lead Aprons and Thyroid Collars in Dental Imaging: Evidence-Based Guidance for Michigan Clinicians

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No apron — Modern dental imaging equipment, digital sensors, and rectangular collimators minimize the patient's radiation exposure. Lead aprons and thyroid collars are ineffective for shielding against internal scatter radiation and are no longer recommended.

The use of lead aprons and thyroid collars during dentomaxillofacial imaging has been a longstanding practice, ingrained in both clinical protocols and patient expectations. However, recent recommendations from the American Academy of Oral and Maxillofacial Radiology (AAOMR) and the American Dental Association (ADA) suggest discontinuing their routine use due to the negligible radiation exposure from modern imaging technologies and the ineffectiveness of these shields against internal scatter radiation.^{1,2}

While these recommendations are rooted in contemporary scientific evidence, many clinicians may still grapple with implementation strategies and patient concerns. This article aims to provide Michigan clinicians with evidence-based guidance to navigate this transition, offering practical advice for patient communication while considering the current regulatory landscape.

Rationale behind updated recommendations

Negligible radiation exposure. Advancements in dental imaging technology have drastically reduced radiation doses, making lead aprons and thyroid collars unnecessary. Modern imaging modalities, such as digital radiography and cone beam computed tomography (CBCT), emit minimal radiation, often at levels comparable to or lower than natural background radiation.³ Studies have consistently demonstrated that the radiation exposure from these procedures is too low

to warrant additional shielding.

A comprehensive review of patient shielding during dentomaxillofacial radiography revealed that scatter radiation is minimal and does not pose a significant risk to patients.³ Moreover, the shielding does not protect against internal scatter radiation — radiation that has already entered the body — rendering the protective gear ineffective in reducing the actual dose absorbed by critical organs.^{7,8}

Furthermore, there is no evidence of heritable effects in humans even after many years of studying the effect of radiation to sperm and ova at higher radiation doses than those used during dental imaging.^{4,5} Dental doses are approximately 10,000-fold lower than the threshold for possible fetal effects on pregnant patients, and the thyroid dose from dental radiographs is at least 50-fold lower than the lowest doses associated with thyroid cancer risk.^{4,1,6}

Technological advancements and improved safety. The use of digital sensors and rectangular collimators is more effective in reducing patient dose than lead aprons and thyroid collars.^{3,9,10,11,13} The evolution of imaging technology has introduced features like automatic exposure control (AEC) in some CBCT machines, which optimizes radiation doses based on the patient's size and the area being imaged.⁸ These systems ensure that radiation dose is as low as possible while achieving the necessary image quality. However, the presence of lead aprons can interfere with these systems, potentially leading to higher radiation doses or may partially block the X-ray beam and obscure anatomy, especially in extraoral radiography.⁸ This may require repeat imaging, which contradicts the intended protective purpose.

The transition away from routine shielding aligns with broader efforts to optimize radiation safety by several other organizations, including the American Association of Physicists in Medicine,⁸ the National Council on Radiation Protection and Measure-

ments,^{12,13} the American College of Radiology, the American Society of Radiologic Technologists, the U.S. Food and Drug Administration, and the Health Physics Society, among others.

The regulatory landscape in Michigan

Current regulations. Federal, state, and local laws and regulations should be revised to remove any actual or implied requirement for routine patient shielding during dentomaxillofacial imaging to align with this evidence-based change in radiation protection practices.

In Michigan, lead aprons and thyroid

collars are not required by law; therefore, the decision to adopt the new recommendation can be seamlessly made by oral health providers. The main challenges in implementing the change are related to training of the oral health care team and patient education.

Michigan dental schools. The implementation strategy at the University of Michigan School of Dentistry included adding the new recommendations to the Basic Radiology didactic curriculum for first-year dental and dental hygiene students, a school-wide in-service training for faculty and staff that was

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By request — Patient education will help disseminate current evidence-based best practices. Balancing evidence-based practice and patient-centered care, lead apron requests can be accommodated if they don't affect image quality or increase radiation dose.

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also recorded and made available for CE credit, and the development of a flyer that includes a QR code to additional information to be posted in the clinics and distributed to patients. Similar steps have been implemented or are in the

planning stages at the University of Detroit Mercy School of Dentistry.

Practical advice for clinicians

One of the primary challenges clinicians face is addressing patient concerns about the removal of lead aprons and thyroid collars. Patients who are accustomed to these protective measures may question the safe-

ty of modern practices. Effective communication is key to ensuring patient confidence and compliance.

Clinicians should explain that advancements in dental imaging technology have significantly reduced radiation exposure, making lead aprons unnecessary.

Patients often worry that removing these protective measures might increase their risk of radiation-related health issues. Clinicians can reassure patients by explaining that the decision to discontinue routine shielding is based on extensive research showing that the radiation levels used in dental imaging are too low to pose a significant risk.^{1,2} Pamphlets summarizing the reasons for the new AAOMR and ADA recommendations, including links to the articles, can serve as valuable resources for patients.

While clinicians should inform patients that lead aprons are no longer necessary, they should also respect patient autonomy. If a patient insists on using a lead apron, clinicians should accommodate the request as long as it does not compromise the quality of the imaging or increase the radiation dose. This approach balances the need for evidence-based practice with patient-centered care. See the box at left for commonly asked patient questions and answers.

Conclusion

The move away from routine use of lead shielding in dental imaging is a significant shift in practice, but one that is well-supported by current evidence. For Michigan clinicians, the challenge lies in navigating this transition within the context of training, education, and patient expectations. By staying informed about the latest recommendations and engaging in transparent, reassuring communication with patients, clinicians can help foster a smoother adoption of these new guidelines. ●

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Common Questions Patients May Ask and How to Address Them

Question: Why are you not using the lead apron anymore?

Answer: The amount of radiation from modern dental X-ray equipment is so small that lead aprons don't provide any additional protection. In fact, using them can sometimes interfere with the imaging process and lead to higher doses of radiation.

Question: Aren't lead aprons supposed to make me safer?

Answer: The amount of radiation from dental X-rays is so small that the risk to you is either very small or zero. Lead shielding provides negligible protection.

Question: But what is the harm in using lead aprons and thyroid collars?

Answer: They may get in the way of the beam, which may require us to re-expose your radiographs. They may also affect the AEC calculations (during a CBCT scan) and increase radiation dose unnecessarily.

Question: Won't radiation exposure to my sperm or ova harm my future children?

Answer: This was a concern in the past; however, this has never been seen in humans even after many years of studying it closely and for people who have been exposed to much larger amounts of radiation than what is used in dental or medical imaging.

Question: What if I'm pregnant?

Answer: Your baby is located far away from the part of your body being imaged, so there is no measurable radiation risk, and therefore no benefit from using shielding.

Question: Will you still shield me if I request it?

Answer: We do not recommend using the lead apron and thyroid collar but, if you insist that we use a shield, we will honor your request if it can be done without compromising the quality of the radiographs.

Question: Aren't children more sensitive to radiation? Why is my child not shielded anymore?

Answer: Even though the thyroid gland is more radiosensitive in children, dental doses are at least 50 times lower than the lowest doses associated with thyroid cancer risk.

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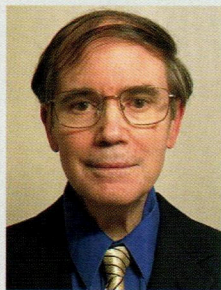
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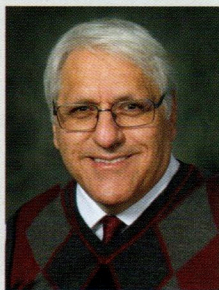
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