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Literature Review of Current Recommendations For Use of Lead Aprons and Thyroid Collars for Dental Radiographs

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OBJECTIVE

Purpose: The purpose of this literature review is to evaluate the current research available regarding efficacy and potential health benefits or potential harm while using lead aprons and thyroid collars for dental radiographs.

BACKGROUND

- Ionizing radiation from the primary x-ray beam and scatter radiation, its byproduct, potentiate the risk of DNA damage and are carcinogenic to the human body's vital organs, particularly the reproductive organs and the thyroid gland.[1]
- Lead aprons and thyroid collars have traditionally been manufactured as shielding devices during radiography to minimize exposure to ionizing radiation and prevent the human body from absorbing scatter radiation. They are used to protect important organs, particularly the reproductive organs and in the abdomen. Thyroid Collars are smaller protective devices worn around the neck to protect the thyroid gland from exposure to radiation. [2]
- The most sensitive population to radiation includes the fetus during pregnancy and in children. Lead aprons with thyroid collars have been indicated to shield against potential long-term effects of radiation in these populations and other individuals.
- Health consequences from radiation increase from cumulative exposure, which occurs when multiple radiographs are taken over time and from continual occupational exposure.
- Previously, the American Dental Association (ADA) has recommended use of thyroid collars and lead aprons while taking dental radiographs. As of February 2024, their policy now advises against their use in all patient populations, including pediatric, pregnant, and regardless of health status.[3]

CONCLUSIONS

- The American Academy of Oral and Maxillofacial Radiology (AAOMR) and American Dental Association (ADA) have advised for discontinuation of use of lead aprons and thyroid collars during dental radiographs including for intraoral, panoramic, CBCT, and cephalometric radiographs. The National Council on Radiation Protection and Measurements (NCRP) stated that the gonadal apron does not significantly reduce risk of radiation exposure and may increase exposure in some circumstances.[1]
- Abdominal shields and thyroid collars have the potential to increase radiation exposure by blocking the primary x-ray beam which may cause artifacts in the film, which can necessitate capturing additional radiographs. In pediatric populations, the lead apron may cause discomfort and result in movements while taking x-rays, decreasing likelihood of obtaining a diagnostic image and increasing number of re-takes.
- External scatter radiation is the radiation that off-sets from the primary beam. Advances in imaging technology, such as digital radiographs and rectangular collimation, limits the beam size and significantly reduce the amount of external scatter radiation dose to the patient. As a result, the amount of external scatter radiation is minimal, and the use of lead aprons offers insignificant additional protection.[2]
- Internal scatter radiation is the main source of radiation exposure in patients. Internal scatter is the radiation that is deflected within the body from the area that was imaged and can travel to other areas and organs in the body. Considering that this scatter accumulates internally, externally-worn lead aprons and thyroid collars lack protection against this radiation. [2]
- The ADA set out key recommendations to minimize exposure to radiation in both patients and dental staff which includes complying with local, state, and federal standards; making a sincere effort to access prior radiographic records; taking new radiographs only as necessary for diagnosis and treatment planning; opting for digital sensors instead of traditional film; implementing rectangular beam collimation; and restricting CBCT use as a supplemental aid. [3]

REFERENCES

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