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Optimizing radiation safety in dentistry

Clinical recommendations and regulatory considerations

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ABSTRACT

Background. The value of dental radiographs to oral health care decision making must be balanced with radiation safety to minimize patient exposure and occupational risk of oral health care providers. This review summarizes recommendations and regulatory guidance regarding dental radiography and cone-beam computed tomography. An expert panel presents recommendations on radiation safety, appropriate imaging practices, and reducing radiation exposure.

Types of Studies Reviewed. A systematic search run in Ovid MEDLINE, Embase, and Cochrane Database of Systematic Reviews identified relevant topical systematic reviews, organizational guidelines, and regulatory reviews published in the peer-reviewed literature since 2010. A supplemental search of the gray literature (eg, technical reports, standards, and regulations) identified topical nonindexed publications. Inclusion criteria required relevance to primary oral health care (ie, general or pediatric dentistry).

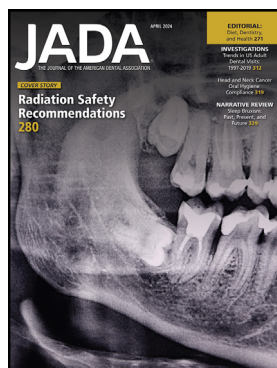
Results. A total of 95 articles, guidance documents, and regulations met the inclusion criteria. Resources were characterized as applicable to all modalities, operator and occupational protection, dose reduction and optimization, and quality assurance and control.

Practical Implications. Understanding factors affecting imaging safety and applying fundamental principles of radiation protection consistent with federal, state, and local requirements are essential for limiting patient ionizing radiation exposure, in conjunction with implementing optimal imaging procedures to support prudent use of dental radiographs and cone-beam computed tomographic imaging. The regulatory guidance and best practice recommendations summarized in this article should be followed by dentists and other oral health care providers.

Key Words. Dental radiography; radiography; dentistry; radiation protection; computer tomography; CBCT; x-ray; panoramic; digital radiograph; radiographic film.

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In 2012, the American Dental Association (ADA) and the US Food and Drug Administration (FDA) published *Dental Radiographic Examinations: Recommendations for Patient Selection and Limiting Radiation Exposure*,¹ and the ADA Council on Scientific Affairs issued an advisory statement on the use of cone-beam computed tomography (CBCT) in dentistry.² This article provides updated evidence-based recommendations, consistent with ADA methodology, on components of the 2012 publications related to dental radiation safety, appropriate imaging practices, recommendations to reduce radiation exposure to patients and personnel, and adherence to relevant regulatory requirements.

These recommendations are based on a comprehensive review of dental radiation safety research, guidance from national and international agencies, and regulatory standards. These broadly applicable recommendations aim to help clinicians develop and implement safety practices that will provide optimal diagnostic value while minimizing radiation risks to patients or personnel. This