Exploring the New Recommendations for Patient Shielding During Imaging

CareQuest Institute Continuing Education Webinar

March 28, 2024

CareQuest Institute for Oral Health®

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- We will keep all lines muted to avoid background noise.
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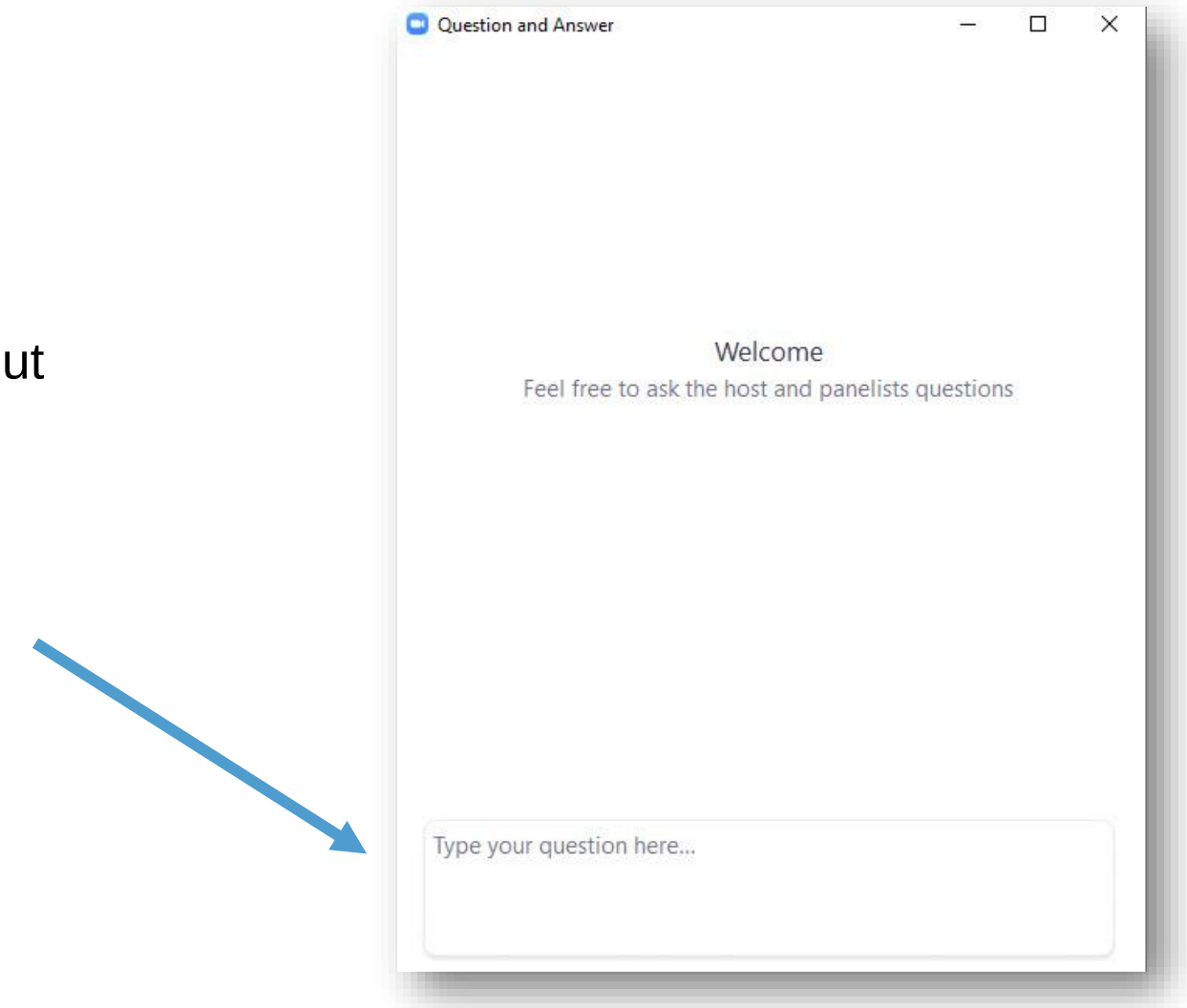
Question & Answer Logistics

- Feel free to enter your questions into the **Question & Answer box** throughout the presentations.
- We will turn to your questions and comments toward the end of the hour.



CareQuest Institute for Oral Health

Thank You!

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Exploring the New Recommendations for Patient Shielding During Imaging

CareQuest Institute for Oral Health

WEBINAR | Thursday, March 28, 2024 | 7–8 p.m. ET | ADA CERP Credits: 1

MODERATOR

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Diplomate, ABOMR, Clinical Professor, University of Michigan

ADA

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Learning Objectives

1. Explain the new patient shielding recommendations during maxillofacial imaging.

2. Examine the rationale for the new shielding and x-ray recommendations.

3. Identify strategies and talking points to address patient questions and concerns about the new shield recommendations.

Outline

1. Radiation effects
2. Guiding principles of radiation protection
3. Current ADA/FDA and NCRP recommendations
4. Effective doses in dentistry
5. New ADA and AAOMR recommendations and rationale
6. Special considerations for pediatric patients
7. Other relevant recommendations
8. Summary and practical considerations

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Radiation Effects

1. **Tissue reactions** (> 100 mGy threshold level)
   - Not seen with dental doses
   - Examples: skin burns, cataracts

2. **Stochastic** (random – no threshold)
   - Risk calculated from data extrapolation using a linear regression model
   - Examples: cancer, heritable effects

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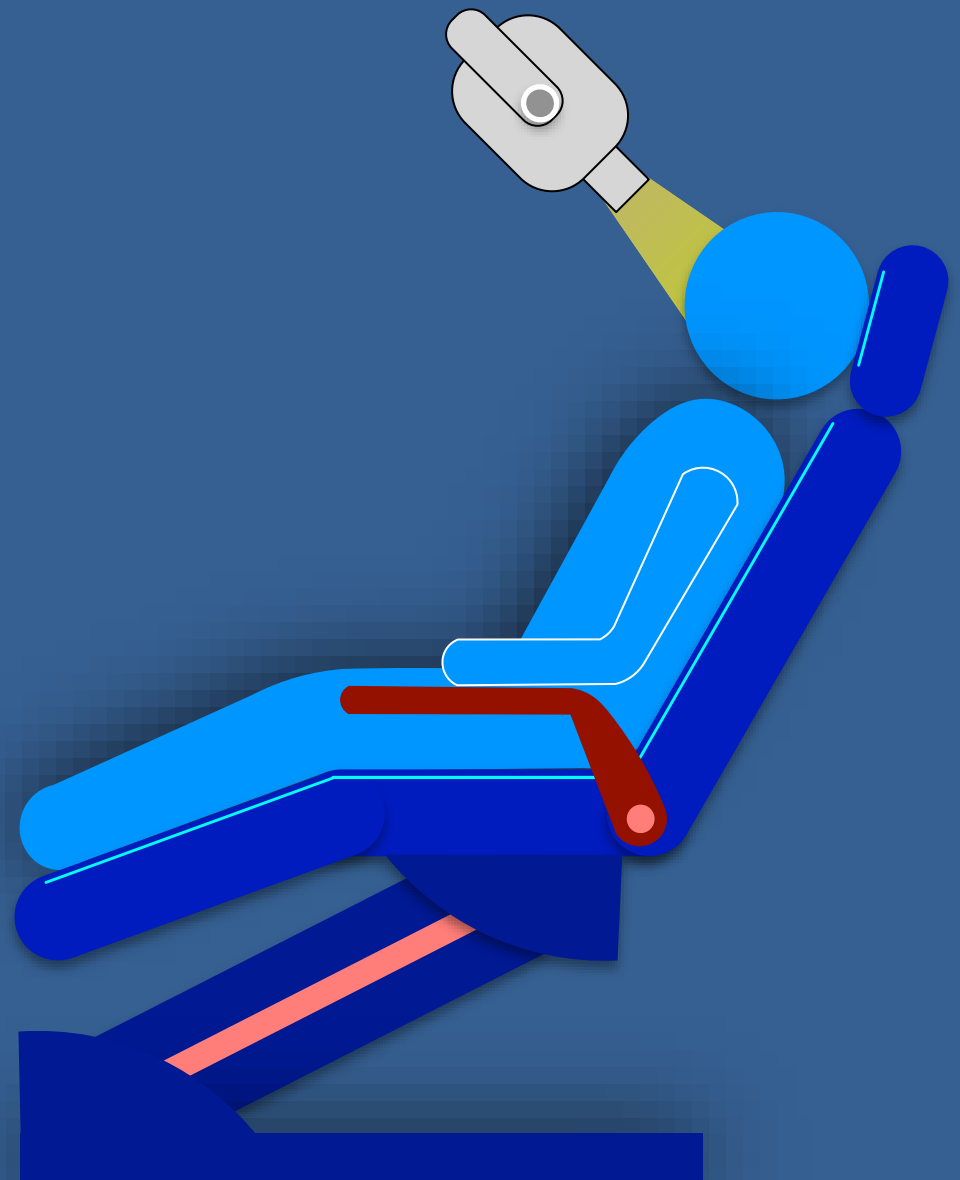
Guiding Principles of Radiation Protection

- ✓**Justification:** Imaging will likely provide answers to the diagnostic questions at hand
- ✓**Optimization:** Imaging techniques will minimize patient radiation dose and provide the necessary diagnostic information
- ✓**Dose limitation:** Benefits from imaging should vastly outweigh the estimated radiation-associated risks



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ADA/FDA Recommendations

ADA American Dental Association®
America's leading advocate for oral health

FDA

DENTAL RADIOGRAPHIC EXAMINATIONS: RECOMMENDATIONS FOR PATIENT SELECTION AND LIMITING RADIATION EXPOSURE

REVISED: 2012

AMERICAN DENTAL ASSOCIATION
Council on Scientific Affairs

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Food and Drug Administration

NCRP Report No. 177

NCRP REPORT No. 177

RADIATION PROTECTION IN DENTISTRY AND ORAL & MAXILLOFACIAL IMAGING

NCRP — SCIENTIFIC AUTHORITY SINCE 1929 • CONGRESSIONALLY CHARTERED •

National Council on Radiation Protection and Measurements

ADA American Dental Association®
America's leading advocate for oral health

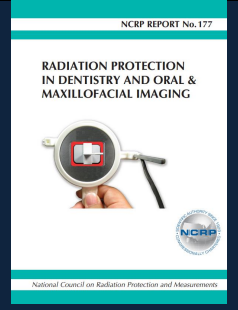
FDA

DENTAL RADIOGRAPHIC EXAMINATIONS: RECOMMENDATIONS FOR PATIENT SELECTION AND LIMITING RADIATION EXPOSURE

REVISED: 2012

Frequency of **Recall BWs** based on **ADA/FDA 2012 Recommendations**

Age	Risk	Frequency (in months)
Child, Adolescent	High	6-12
Adult	High	6-18
Child	Low	12-24
Adolescent	Low	18-36
Adult	Low	24-36



NCRP recommendations to keep radiation **A**s **L**ow A**s** **R**easonably **A**chievable

- ✓ **High kVp**
- ✓ Filtration
- ✓ **Rectangular collimator**
- ✓ Long cone
- ✓ **Sensor/plate**
- ✓ Sensor/plate holder beam guiding devices
- ✓ **Leaded apron with thyroid collar - no longer**
- ✓ Proper processing
- ✓ **Thorough interpretation**

UNIVERSITY OF MICHIGAN

History of Patient Shielding

1950

Gonadal shielding was introduced with the intent to minimize the potential for heritable genetic effects from diagnostic X-ray exposure

History of Patient Shielding

2019

Research done by the American Association of Physicists in Medicine and the National Council on Radiation Protection and Measurements supports:

- Gonadal and fetal shielding provide negligible, or no benefit to patient's health
- The use of gonadal and fetal shielding can negatively affect the efficacy of the exam

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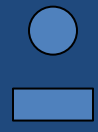
Table 1. Effective dose and equivalent background radiation exposure time for selected dental and medical radiographic examinations and procedures.

TYPE OF EXAMINATION	EFFECTIVE DOSE, AVERAGE OR RANGE,* μSv	AVERAGE BACKGROUND RADIATION EQUIVALENT, D†
Dental Radiograph Examination Exposure		
Full-mouth series—18 images, adult[34,35]		
PSP‡ or F-speed film and rectangular collimation	34.9	4
PSP or F-speed film and round collimation	170.7	20
Full-mouth series—12 images, pediatric[36]		
PSP or F-speed film and rectangular collimation	44 (44-85)	5
PSP and round collimation	89.0	11
Bite-wing		
Digital, single[37]	0.3 (premolar), 1.4 (molar)	< 1
4 images with PSP or F-speed film and rectangular collimation[34,37]	3.4-5.0	< 1§
Extraoral radiographs		
Panoramic charge-coupled device[34,37]	14.2-30.0	2-3.5
Panoramic PSP[37]	19.0-75.0	2-9
Cephalometric[34,38]	2.0-10.0	< 1-1.3§
Cone-beam computed tomography—adult[35]		
Small FOV¶	19-652	2-77
Medium FOV	45-860	5-101
Large FOV	68-1,073	8-126
Cone-beam computed tomography—pediatric[31,39]		
Small FOV	7-521	1-61§
Medium or large FOV	13-769	1.5-91§
Comparative Effective Dose From Medical Examinations		
Conventional head CT scan#,[35]	860-1,500	101-177
Low-dose protocol head CT scan[35]	180-534	21-63
Brain CT scan[38]	1,600	188§
Abdominal and pelvic CT[38]	7,700	905

* All values follow International Commission on Radiation Protection 103[34] methodology unless otherwise noted. † National Council on Radiation Protection and Measurements 177[35] estimates unless otherwise noted. ‡ PSP: Photo-stimulable phosphor. § Estimated per capita based on average natural background radiation 3.1 mSv per year. ¶ FOV: Field of view. # CT: Computed tomographic.

Effective Doses in Dentistry*
(background radiation equivalent)

- Background radiation: **~8 µSv/day** (~3 mSv/year)
- **1 PAN: ~ 14-30 µSv** (2-4 days)
- **1 FMX** (F-speed/ plates,): **~ 171 µSv** (21 days)
- **1 FMX** (F-speed/plates,): **~ 35 µSv** (4 days)
- **4 BWs** (F-speed/plates,): **~ 5 µSv** (0.6 days)
- **CBCT** (adult): **~19-1073 µSv** (2-126 days)



= Round collimator
= Rectangular collimator

* Radiation doses may vary, depending on source of data and how the effective dose is calculated (ICRP 1990 vs ICRP 2007)

Nationwide Evaluation of X-Ray Trends (NEXT)

- **68%** dental offices use direct digital sensors
- **18%** use photostimulable storage phosphor
- **14%** silver halide film-based imaging
- **80%** of panoramic radiographic units in dental offices use digital receptors

Nationwide Evaluation of X-Ray Trends (NEXT): tabulation and graphical summary of the 2014-2015 dental survey
MC Hilohi, G Eicholtz, J Eckerd, DC Spelic - 2019

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AAOMR
AMERICAN ACADEMY OF
ORAL AND MAXILLOFACIAL RADIOLOGY

Practice Guidelines

Patient shielding during dentomaxillofacial radiography

Recommendations from the American Academy of Oral and Maxillofacial Radiology

Erika Benavides, DDS, PhD; Avni Bhula, BDS, DDS, MSc; Anita Gohel, BDS, PhD; Alan G. Lurie, DDS, PhD; Sanjay M. Mallya, BDS, MDS, PhD; Aruna Ramesh, BDS, MS, DMD; Donald A. Tyndall, DDS, MSPH, PhD

ABSTRACT

Background. The American Academy of Oral and Maxillofacial Radiology established an ad hoc committee to draft evidence-based recommendations and clinical guidance for the application of patient contact shielding during dentomaxillofacial imaging.

Types of Studies Reviewed. The committee reviewed monographs and reports from radiation protection organizations and studies that reported radiation dose to gonads, breasts, and thyroid gland from dentomaxillofacial imaging.

Results. Considering the absence of radiation-induced heritable effects in humans and the negligible dose to the gonads and fetus from dentomaxillofacial imaging, the committee recommends discontinuing shielding of the gonads, pelvic structures, and fetuses during all dentomaxillofacial radiographic imaging procedures. On the basis of radiation doses from contemporaneous maxillofacial imaging, the committee considered that the risks from thyroid cancer are negligible and recommends that thyroid shielding not be used during intraoral, panoramic, cephalometric, and cone-beam computed tomographic imaging.

Practical Implications. This position statement informs and educates the reader on evolving radiation protection practices and provides simple, unequivocal guidance to dental personnel to implement these guidelines. State and local authorities should be contacted to update regulations to reflect these recommendations.

Key Words. Radiation effects; radiation shielding; radiation protection; thyroid collar; lead apron.

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https://doi.org/10.1016/j.adaj.2023.06.015

ADA

Evidence-Based Recommendations

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).

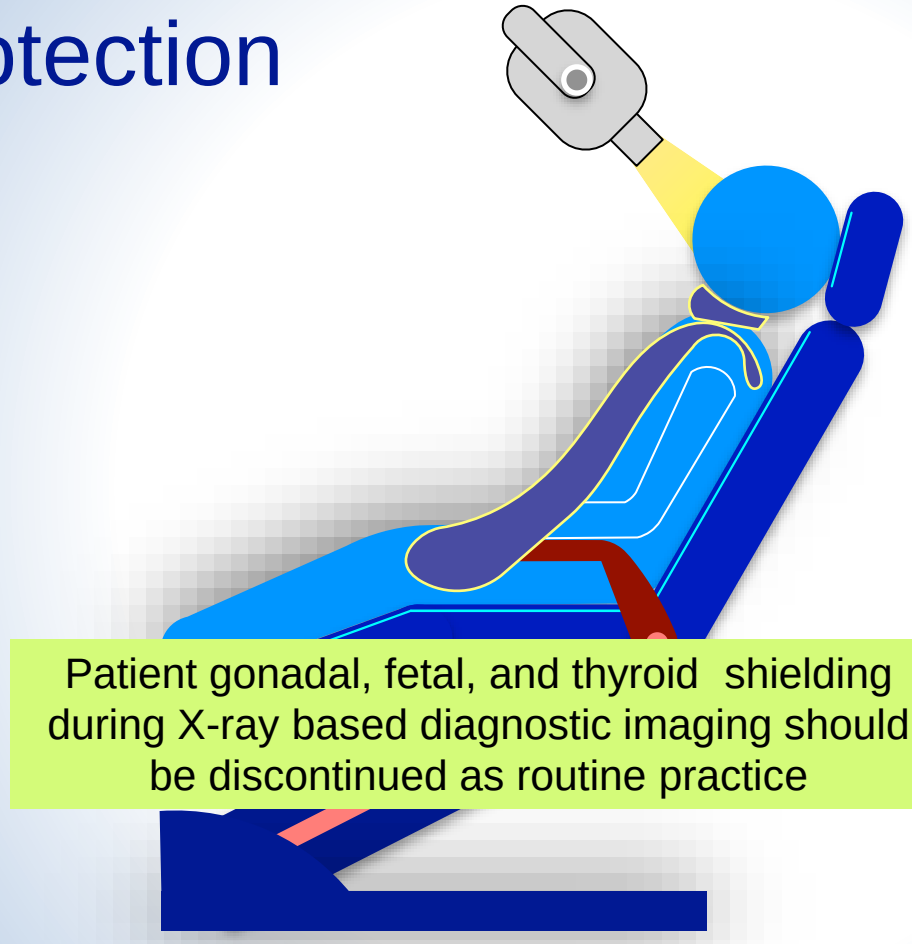
Results. A total of 95 articles, guidance documents, and regulations met the inclusion criteria. Resources were characterized as applicable to all modalities, operator and occupational protection, dose reduction and optimization, and quality assurance and control.

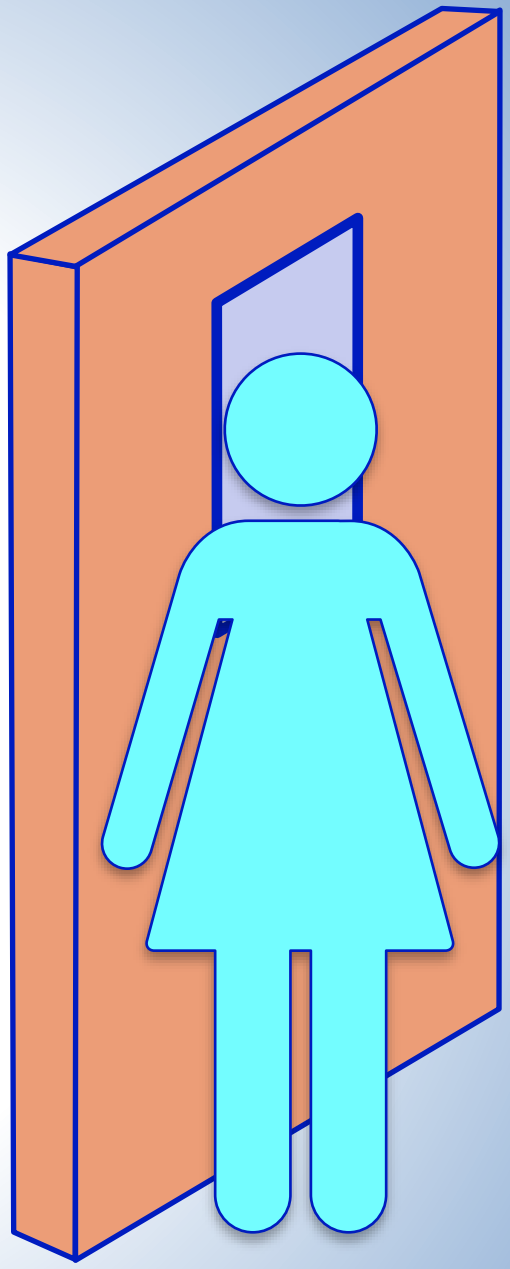
Practical Implications. Understanding factors affecting imaging safety and applying fundamental principles of radiation protection consistent with federal, state, and local requirements are essential for limiting patient ionizing radiation exposure, in conjunction with implementing optimal imaging procedures 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.

JADA 2024:■(■):■-■
https://doi.org/10.1016/j.adaj.2023.12.002

Paradigm Shift in Radiation Protection



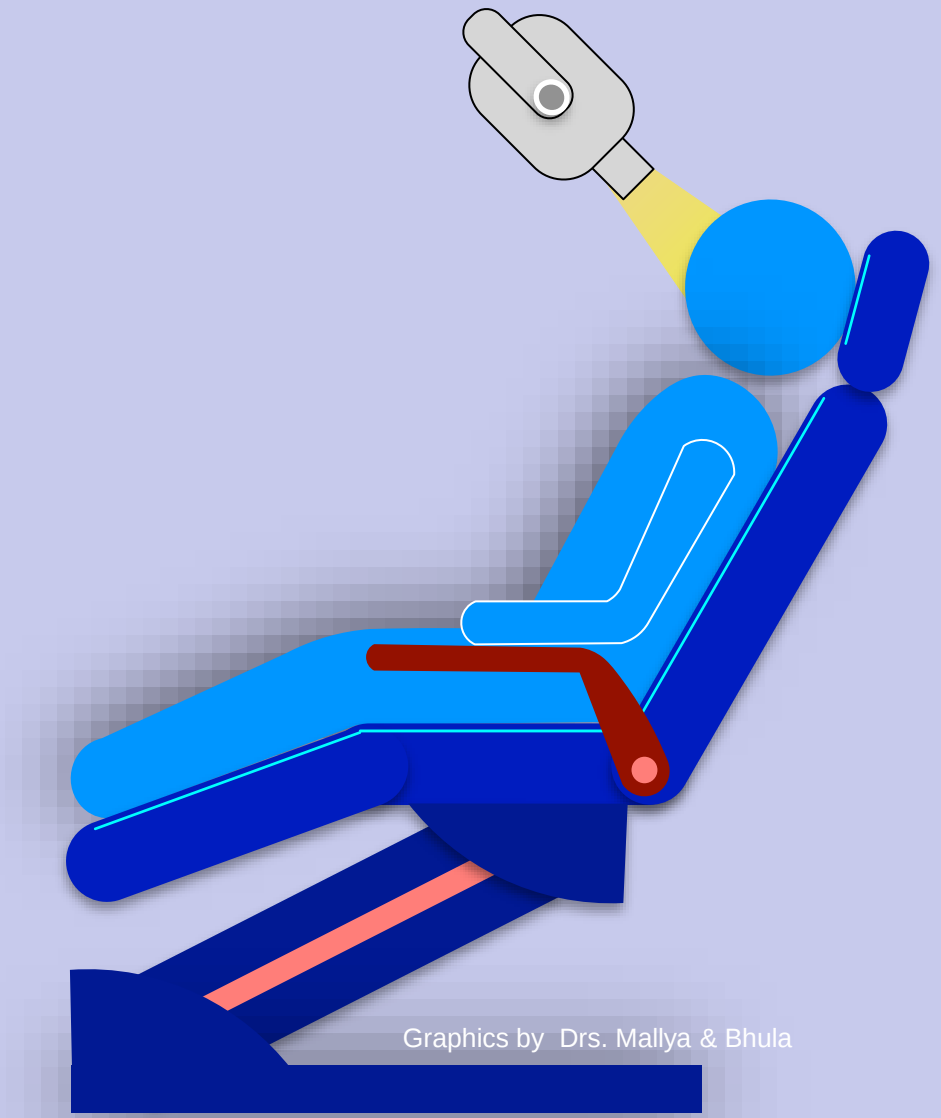


Patient gonadal, fetal, and thyroid shielding during X-ray based diagnostic imaging should be discontinued as routine practice

Courtesy of Drs.Sanjay Mallya and Avni Bhula

Why discontinue gonadal and fetal shielding?

- ✓ Negligible scattered radiation
- ✓ No heritable effects in humans
- ✓ Does not reduce internal scatter
- ✓ May obscure anatomy
- ✓ May interfere with automatic exposure control in CT and CBCT units



Graphics by Drs. Mallya & Bhula

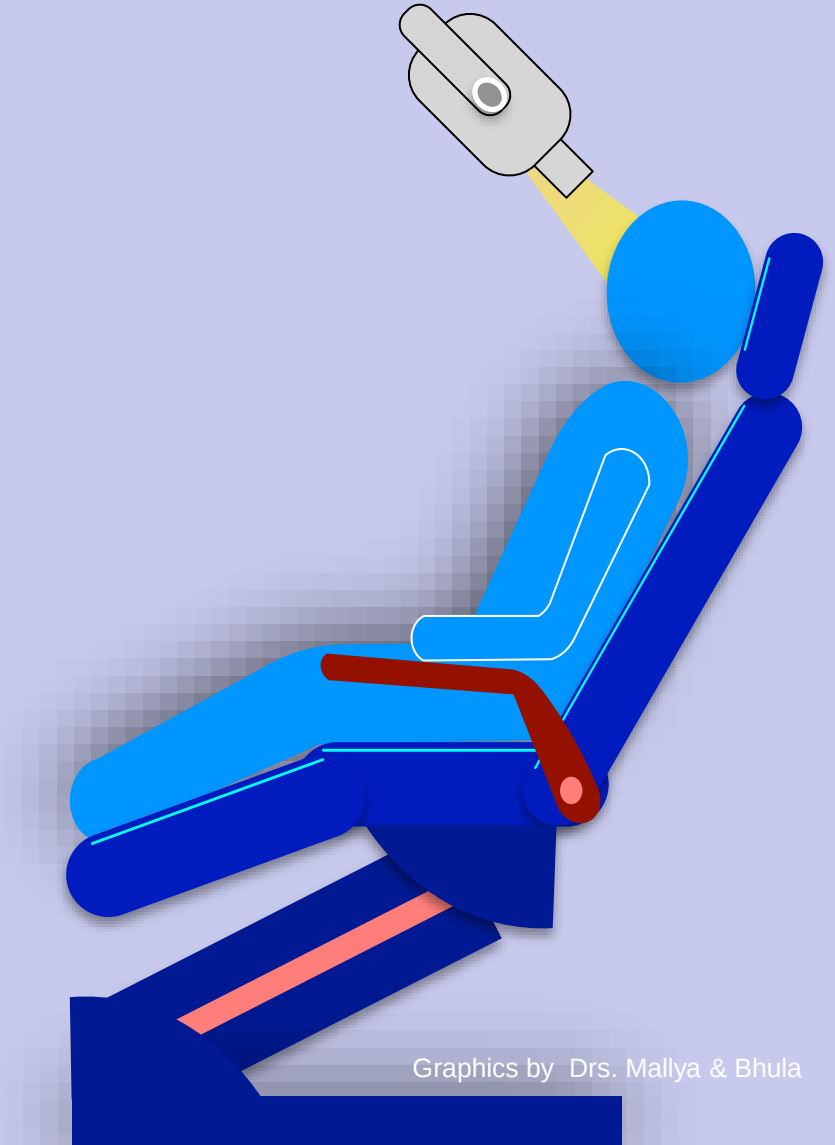
Table 1. Effects of prenatal radiation exposure.

EFFECT	THRESHOLD DOSE, mGy*	SENSITIVE GESTATION PERIOD*	RISK FROM ORAL AND MAXILLOFACIAL IMAGING†
Prenatal Death	100	< 10 d	None; fetal dose approximately 10,000-fold lower than threshold
Microcephaly	100	2-15 wk	None; fetal dose approximately 10,000-fold lower than threshold
Growth Retardation	100	2-15 wk	None; fetal dose approximately 10,000-fold lower than threshold
Intellectual Disability	300	8-15 wk	None; fetal dose approximately 30,000-fold lower than threshold
Radiation-Induced Cancer	None‡	Throughout pregnancy‡	Negligible, approximately 1 in 1.7 million§

* Data from the International Commission on Radiological Protection.[26] † Fetal dose from dentomaxillofacial imaging, including cone-beam computed tomography, estimated at 0.01 mGy.[22] ‡ Radiation-induced cancer is considered a stochastic risk[26]; however, cancer induction in utero is not observed with doses less than 10 mGy.[26] § Cancer risk calculated on the basis of linear no-threshold model[27] and an excess absolute risk of 6% per Gy.[28]

Why discontinue thyroid shielding?

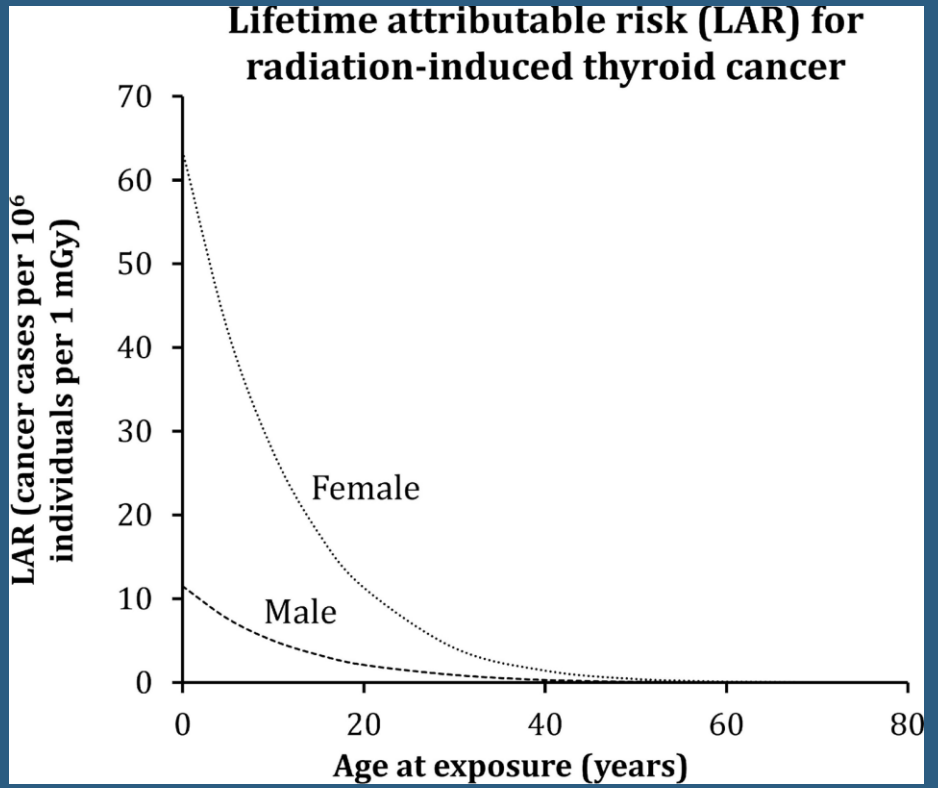
- ✓Thyroid dose at least 50-fold lower than lowest doses associated with thyroid cancer risk
- ✓Digital receptors and rectangular collimators are more effective in reducing dose to thyroid gland
- ✓May obscure anatomy
- ✓May interfere with automatic exposure control in CT and CBCT units



Graphics by Drs. Mallya & Bhula

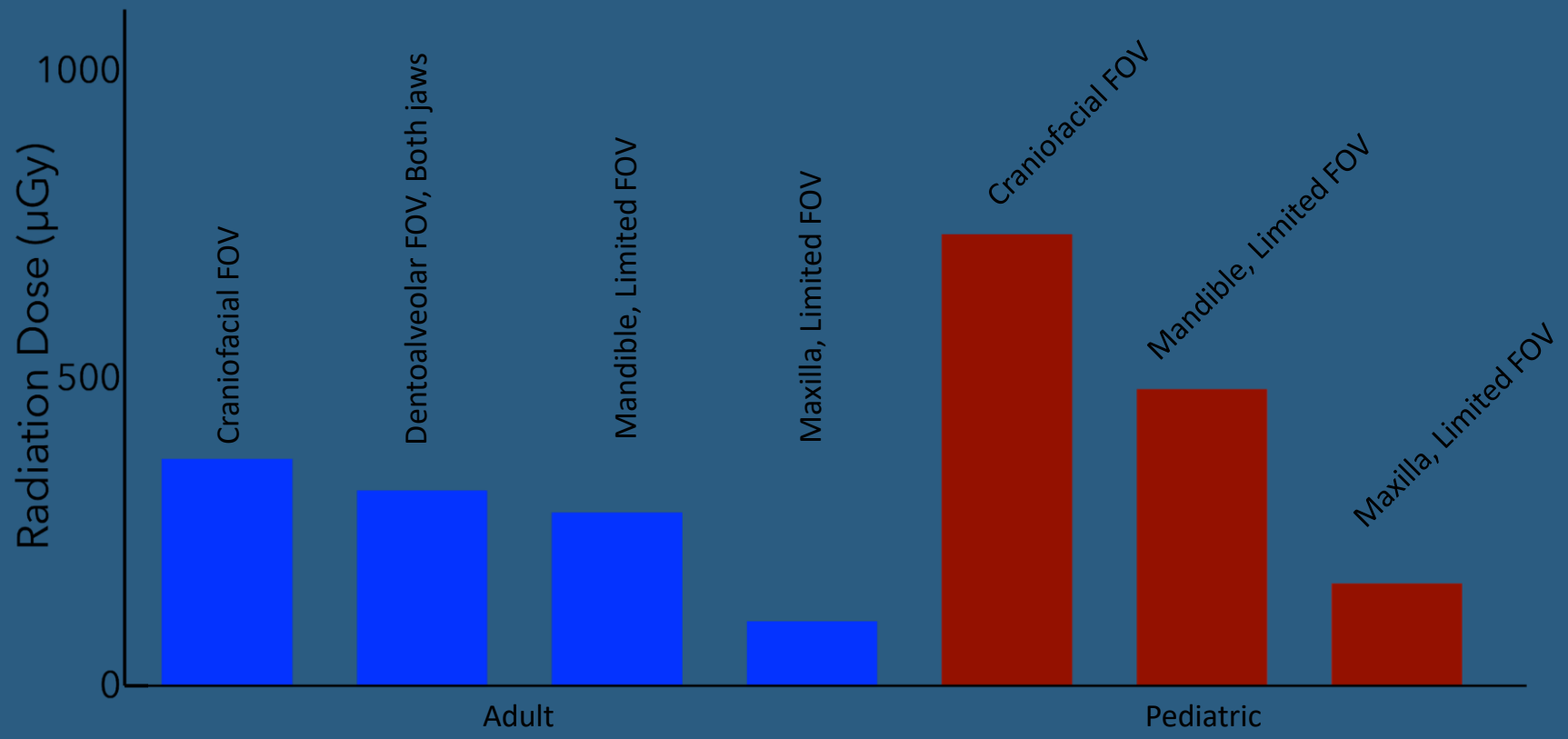
Radiation-Associated Thyroid Cancer

- Estimated risk
  - **7.5** cases fatal cancer per 0.01 Gy per 10^6 individuals
- Strong inverse relationship between cancer risk and age at exposure, < 20y
- No risk at exposure >40y
- Women
  - **2 times higher** (BEIR VII)
  - Equal risk (NCRP)



BEIR VII
Courtesy of Dr. Sanjay Mallya

Absorbed Dose: Thyroid Gland



Risks of radiation-induced thyroid cancer at doses of ~ 50 mGy (50,000 µGy) and higher

Courtesy of Dr. Sanjay Mallya

Table 3. Median thyroid-absorbed doses from dental maxillofacial imaging.*

PROCEDURE	THYROID-ABSORBED RADIATION DOSES,† mGy	
	Unshielded	Shielded
Intraoral Radiography, FMX,‡ Round Collimation, F-Speed Radiograph or Photostimulable Storage Phosphor	0.8	0.5
Intraoral Radiography, FMX, Rectangular Collimation, F-Speed Radiograph or Photostimulable Storage Phosphor	0.4	0.3
Intraoral Radiography, FMX, Rectangular Collimation, Complementary Metal-Oxide Semiconductor Sensors§	0.2	0.1
Intraoral Radiography, Bite-Wing Radiographs	0	NA¶
Panoramic Radiography	< 0.1	< 0.1
Cephalometric Radiography	< 0.1	< 0.1
Cone-Beam CT#	0.3	0.1**
Head and Craniofacial CT, Range	0.6-8.7	NA
Mammography, Range	0.4-0.8	NA
Chest CT, Mean (SD)	18 (8)	NA

* Published studies used to compile these data are provided in eTable 2 (available online at the end of this article). † Doses less than 0.1 mGy are reported as a single category. This dose is 500- through 1,000-fold less than the lowest doses with demonstrable carcinogenic effects in humans. ‡ FMX: Full-mouth radiographic examination. § Dose reduction with use of direct digital sensors is estimated at 50% on the basis of the published literature. ¶ NA: Not applicable. # CT: Computed tomography. ** Dose reduction with thyroid shield is estimated on the basis of the dose reduction factor computed from published reports as listed in eTable 2 (available online at the end of this article).

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Special Considerations for Pediatric Patients

Children and young adults are more susceptible to the effects of radiation exposure due to a higher sensitivity of organs as well as the longer expected life span, resulting in a greater cumulative effect.[7,12,27,29,30,95] In accordance with recommendation 3.0.4, the size and age of the patient, especially eruption sequence and spacing in children (recommendation 3.3.1), must be taken into account when prescribing radiographic examinations.

Radiographic imaging using any modality should be justified clinically.[2,7,8,25,35,64,95,96] Of particular concern is exposure of the thyroid to the x-ray beam,[11,29] and, therefore, careful patient positioning and application of dose-reduction measures, including rectangular collimation for intraoral radiographs, are essential.

3.0.4	Where possible the x-ray imaging equipment shall be configured to optimize imaging and dosimetric performance specific to the size and age of the patient.

3.3 Special Considerations for Pediatric Patients for All Modalities

3.3.1	Pediatric patients shall be imaged using radiographic device configurations as labeled by the manufacturer and optimized specifically for such patients.

image gently®

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Recommendations Are in Alignment with:

- ✓ American Association of Physicists in Medicine (AAPM)
- ✓ National Council on Radiation Protection and Measurements (NCRP)
- ✓ American College of Radiology (ACR)
- ✓ American Society of Radiologic Technologists (ASRT)
- ✓ U.S. Food and Drug Administration (FDA)
- ✓ Health Physics Society (HPS)
- ✓ Joint Review Committee on Education in Radiologic Technology (JRCERT)

AAPM Position: Gonadal Shielding

Policy number	Policy name	Policy date	Sunset date
PP 32-A	AAPM Position Statement on the Use of Patient Gonadal and Fetal Shielding	4/2/2019	12/31/2024

Policy source

April 2-3, 2019 Board of Directors Meeting Minutes

Policy text

Patient gonadal and fetal shielding during X-ray based diagnostic imaging should be discontinued as routine practice. Patient shielding may jeopardize the benefits of undergoing radiological imaging. Use of these shields during X-ray based diagnostic imaging may obscure anatomic information or interfere with the automatic exposure control of the imaging system. These effects can compromise the diagnostic efficacy of the exam, or actually result in an increase in the patient's radiation dose. Because of these risks and the minimal to nonexistent benefit associated with fetal and gonadal shielding, AAPM recommends that the use of such shielding should be discontinued.

For patients or guardians experiencing fear and anxiety about radiation exposure, the use of gonadal or fetal shielding may calm and comfort the patient enough to improve the exam outcome (1). This may be considered when developing shielding policies and procedures. However, blanket statements requiring the use of such shielding are not supported by current evidence (2-4). Additionally, the AAPM recommends that radiologic technologist educational programs (including patient outreach efforts) provide information about the limited utility and potential drawbacks of gonadal and fetal shielding.

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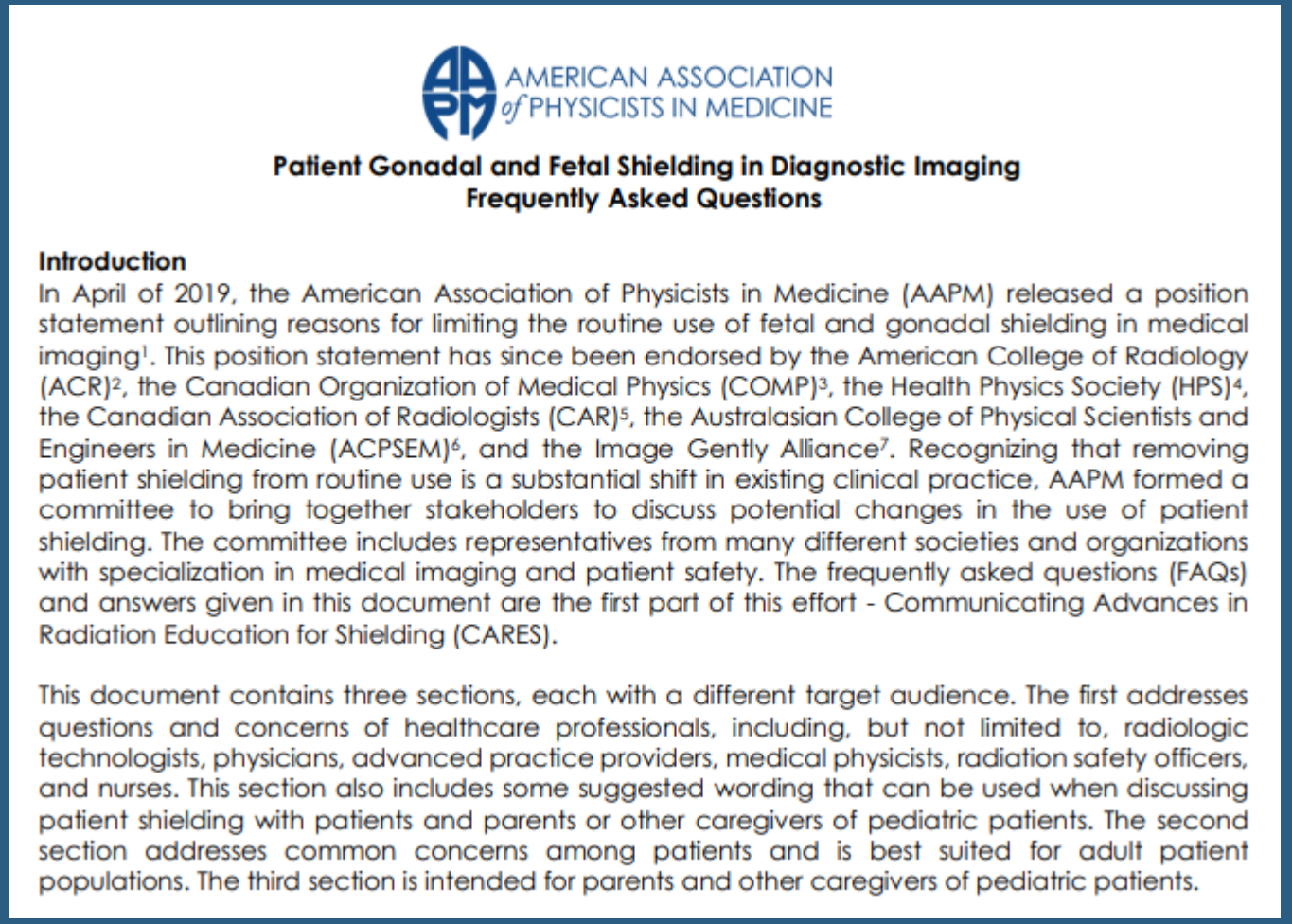
American Association of Physicists in Medicine (AAPM)



AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

Patient Gonadal and Fetal Shielding in Diagnostic Imaging
Frequently Asked Questions

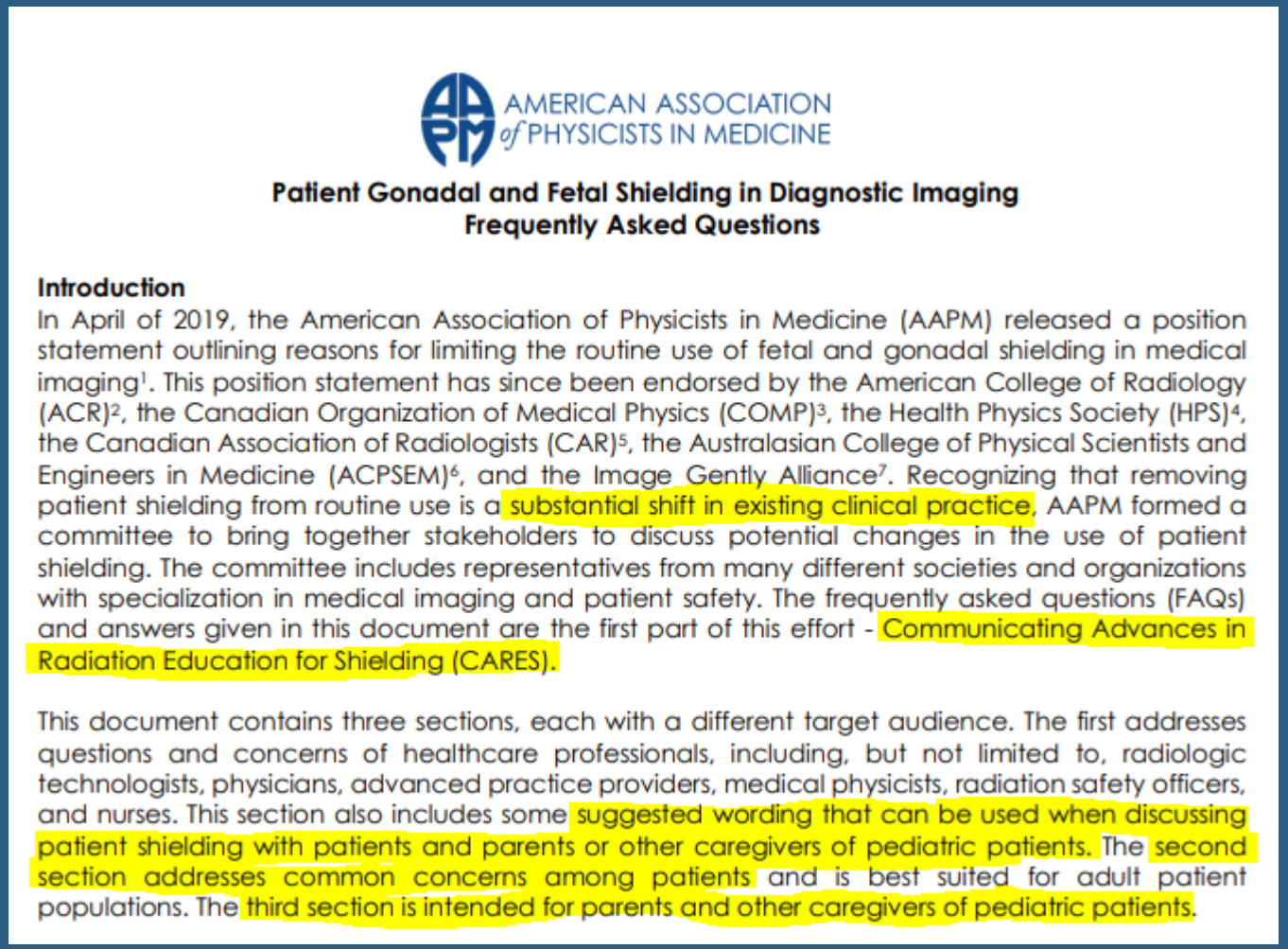
Introduction

In April of 2019, the American Association of Physicists in Medicine (AAPM) released a position statement outlining reasons for limiting the routine use of fetal and gonadal shielding in medical imaging[1]. This position statement has since been endorsed by the American College of Radiology (ACR)[2], the Canadian Organization of Medical Physics (COMP)[3], the Health Physics Society (HPS)[4], the Canadian Association of Radiologists (CAR)[5], the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM)[6], and the Image Gently Alliance[7]. Recognizing that removing patient shielding from routine use is a substantial shift in existing clinical practice, AAPM formed a committee to bring together stakeholders to discuss potential changes in the use of patient shielding. The committee includes representatives from many different societies and organizations with specialization in medical imaging and patient safety. The frequently asked questions (FAQs) and answers given in this document are the first part of this effort - Communicating Advances in Radiation Education for Shielding (CARES).

This document contains three sections, each with a different target audience. The first addresses questions and concerns of healthcare professionals, including, but not limited to, radiologic technologists, physicians, advanced practice providers, medical physicists, radiation safety officers, and nurses. This section also includes some suggested wording that can be used when discussing patient shielding with patients and parents or other caregivers of pediatric patients. The second section addresses common concerns among patients and is best suited for adult patient populations. The third section is intended for parents and other caregivers of pediatric patients.

https://www.aapm.org/org/policies/documents/CARES_FAQs_Patient_Shielding.pdf

American Association of Physicists in Medicine (AAPM)



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Frequently Asked Questions

Introduction

In April of 2019, the American Association of Physicists in Medicine (AAPM) released a position statement outlining reasons for limiting the routine use of fetal and gonadal shielding in medical imaging[1]. This position statement has since been endorsed by the American College of Radiology (ACR)[2], the Canadian Organization of Medical Physics (COMP)[3], the Health Physics Society (HPS)[4], the Canadian Association of Radiologists (CAR)[5], the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM)[6], and the Image Gently Alliance[7]. Recognizing that removing patient shielding from routine use is a substantial shift in existing clinical practice, AAPM formed a committee to bring together stakeholders to discuss potential changes in the use of patient shielding. The committee includes representatives from many different societies and organizations with specialization in medical imaging and patient safety. The frequently asked questions (FAQs) and answers given in this document are the first part of this effort - Communicating Advances in Radiation Education for Shielding (CARES).

This document contains three sections, each with a different target audience. The first addresses questions and concerns of healthcare professionals, including, but not limited to, radiologic technologists, physicians, advanced practice providers, medical physicists, radiation safety officers, and nurses. This section also includes some suggested wording that can be used when discussing patient shielding with patients and parents or other caregivers of pediatric patients. The second section addresses common concerns among patients and is best suited for adult patient populations. The third section is intended for parents and other caregivers of pediatric patients.

https://www.aapm.org/org/policies/documents/CARES_FAQs_Patient_Shielding.pdf

NCRP Commentary #13

National Council on Radiation Protection and Measurements
7910 Woodmont Avenue / Suite 400 / Bethesda, MD 20814-3095
http://ncrponline.org

NCRP Recommendations for Ending Routine Gonadal Shielding During Abdominal and Pelvic Radiography

NCRP Statement No. 13, January 12, 2021

Gonadal shielding obscures portions of pelvic anatomy and may obscure important findings on radiographs.
This limits the practical dimensions and area of the shield.

National Council on Radiation Protection and Measurements. NCRP recommendations for ending routine gonadal shielding during abdominal and pelvic radiography [NCRP Statement No. 13]; 2021. Frantzen et al, Insights Imaging (2012) 3:23–32; Photo credit: IndoSurgicals Medical Equipment Manufacturer

Findings of the National Council on Radiation Protection and Measurements

Statement 13

"The risks of heritable genetic effects are now considered to be **much less** than previously estimated."

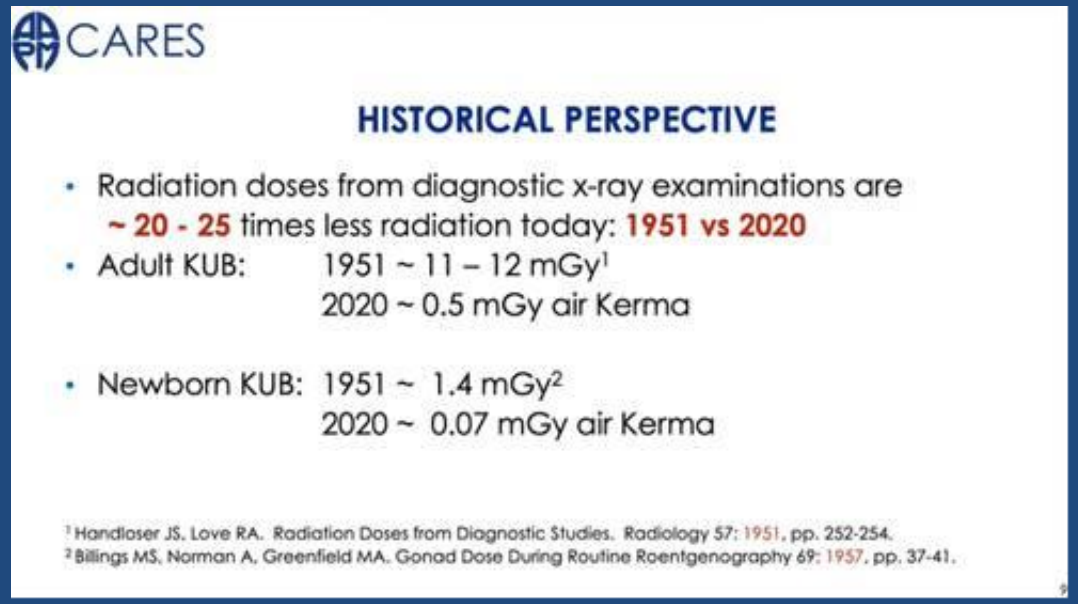
"A substantial portion of gonadal dose to the ovaries is delivered by scattered x rays that **are not attenuated by gonadal shielding**."

National Council on Radiation Protection and Measurements. NCRP recommendations for ending routine gonadal shielding during abdominal and pelvic radiography [NCRP Statement No. 13]; 2021.

Findings of the National Council on Radiation Protection and Measurements

Statement 13

"Improvements in technology since the 1950s have resulted in up to a 95% reduction in the absorbed dose to pelvic organs from radiography."



National Council on Radiation Protection and Measurements. NCRP recommendations for ending routine gonadal shielding during abd and pelvic radiography [NCRP Statement No. 13]; 2021.

Findings of the National Council on Radiation Protection and Measurements

Statement 13

"Gonadal shielding can interfere with the use of automatic exposure control (AEC) and thereby cause an increase in dose to other pelvic and abdominal organs that may be more radiosensitive."

National Council on Radiation Protection and Measurements. NCRP recommendations for ending routine gonadal shielding during abdom and pelvic radiography [NCRP Statement No. 13]; 2021.

“As a result, NCRP has concluded that in most circumstances **gonadal shielding use does not contribute significantly to reducing risks from exposure** and may have the unintended consequences of increased exposure and loss of valuable diagnostic information, and therefore the use of gonadal shielding is not justified as a routine part of radiological protection.”

National Council on Radiation Protection and Measurements. NCRP recommendations for ending routine gonadal shielding during abdo and pelvic radiography [NCRP Statement No. 13]; 2021.

Outline

1. Radiation effects
2. Guiding principles of radiation protection
3. Current ADA/FDA and NCRP recommendations
4. Effective doses in dentistry
5. New ADA and AAOMR recommendations and rationale
6. Special considerations for pediatric patients
7. Other relevant recommendations
8. **Summary and practical considerations**

Summary

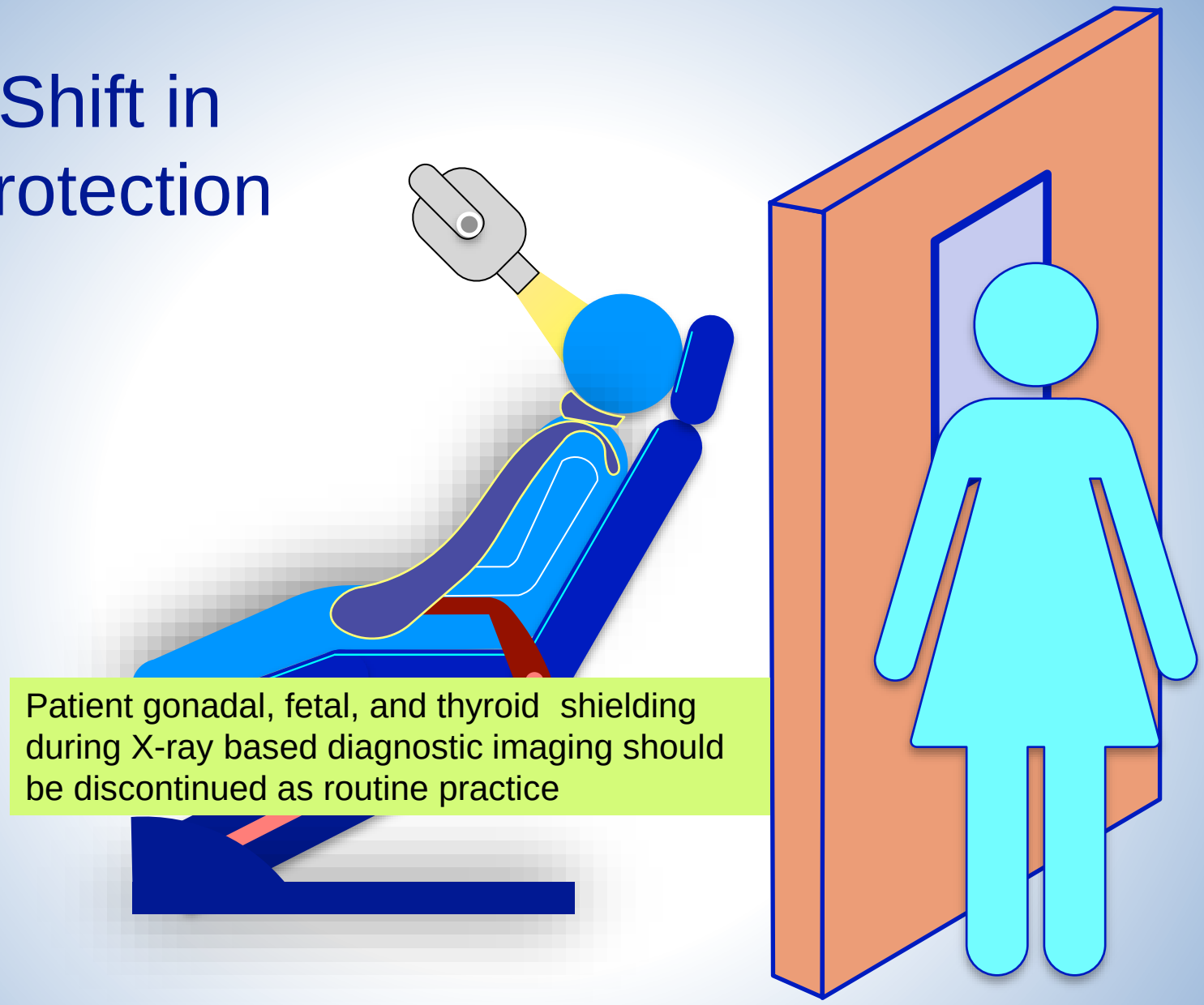
Box 1. Priority recommendations.*

RECOMMENDATION

1. Familiarity with and adherence to all applicable local, state, and federal laws (recommendation 1.0.1)
2. Radiographs should be ordered based on diagnostic and treatment planning needs, and dentists shall make a good-faith attempt to obtain radiographs from previous dental examinations (recommendation 3.0.1)
3. Use digital receptors instead of film for intraoral, panoramic, and cephalometric imaging (recommendation 3.1.1.0)
4. Use rectangular collimation whenever possible for intraoral imaging (recommendation 3.1.2)
5. Use cone-beam computed tomography only when lower-exposure options will not yield the needed diagnostic information (recommendation 3.2.1)

*See Box 2 for a full list of recommendations.

Paradigm Shift in Radiation Protection



Patient gonadal, fetal, and thyroid shielding during X-ray based diagnostic imaging should be discontinued as routine practice

Courtesy of Drs.Sanjay Mallya and Avni Bhula

Practical Considerations

- ✓ Be familiar with your state rules and laws
- ✓ Transition period during implementation
- ✓ Our role in education and dissemination of the latest evidence-based best practices
- ✓ Frequently asked questions and talking points:
  - ✓ AAPM FAQs document
  - ✓ Michigan Medicine pamphlet
  - ✓ AAOMR pamphlets coming soon!

American Association of Physicists in Medicine (AAPM)

Frequently Asked Questions
Target Audience: Healthcare Professionals

A1. Shouldn't we shield the gonads, especially for children, to minimize the risk of genetic damage to future generations?
Gonadal shielding was introduced into clinical practice over 70 years ago, when it was believed that exposing the gonads to radiation could damage reproductive cells such as sperm-producing cells and eggs, causing damage to patients' future offspring.[8] However, these genetic effects have not been observed in humans, even 3 to 4 generations after the atomic bombings.[9] International radiation protection organizations have lowered the risk weighting to the gonads in every successive revision of their tissue risk weighting factors since such factors were introduced in 1977.[10,11]

Suggested Talking Point:
There is no evidence that radiation from medical imaging damages reproductive cells such as eggs or those that produce sperm.

A2. Shouldn't we continue to shield the gonads so that we don't increase the risk of infertility?
The amount of radiation required to cause infertility is more than 100 times the dose from a medical imaging exam.[11] For example, the gonadal dose to an X-ray of the pelvis is less than 0.8 mGy for a teenage boy and less than 0.3 mGy for a teenage girl. Gonadal doses for newborns receiving medical imaging is about 90% lower than this.[12] In comparison, male fertility is not affected below an acute dose of 150 mGy. Permanent sterility does not occur in males below 3500 mGy. Female fertility is not affected below 2500 mGy.[11]

Suggested Talking Point:
The dose required to cause infertility is much higher than that used during a medical imaging exam.

A3. Why should we no longer shield patients routinely?
Any intended decrease in radiation exposure from shielding is negligible compared to the dose from radiation that is scattered within the patient's body. Shields do little or nothing to benefit the patient.[13-17] As with other areas of medicine, the use of patient shielding should be evaluated from a risk-benefit perspective. For example, any time a shield is used, there is a risk that it will cover and obscure anatomy that is important for an accurate diagnosis.[12,18-30] Since shielding can introduce these risks and provides little or no benefit to the patient, we should discontinue using shields as part of routine practice.

Suggested Talking Point:
Shields may cover up parts of your body that your doctor needs to be able to see. If this happens, we may have to repeat your image.

https://www.aapm.org/org/policies/documents/CARES_FAQs_Patient_Shielding.pdf

Frequently Asked Questions
Target Audience: Patients

B1. Why do you not shield patients anymore?
Patient shielding has been used for more than 70 years. We have better equipment that uses much less radiation and operates differently. We also know more about how radiation affects the human body and that some parts of the body - like the testicles and ovaries - are less sensitive to radiation than we used to think.

Most modern X-ray, fluoroscopy, and CT machines can automatically determine how much radiation to use based on the part of the body being imaged. If a shield gets in the way, it could mean an increase in radiation dose.

Since we have equipment that can give us better information using less radiation than in the past, patient shields are no longer beneficial.

B2. Doesn't shielding make me safer?
The amount of radiation used in most imaging exams is so small that the risk to you is either very small or zero. Shields provide negligible protection.

B3. But what's the harm in shielding?
When the reproductive organs are far away from the part of your body being imaged, there is no benefit from using shielding. When the part of your body receiving X-rays is close to your reproductive organs, a shield may cover up parts of your body that your doctor needs to be able to see. If this happens, we may have to repeat your exam.

B4. Won't radiation exposure to my sperm or ovaries harm my future children?
Since the 1950s, people were concerned that radiation might damage sperm or eggs and that this damage would be passed down to your future children. However, this has never been seen in humans even after many generations (years) of studying it closely. This is true even for people who have been exposed to much larger amounts of radiation than what is used in medical imaging.

B5. What if I'm pregnant?
We have equipment that can give us better information than ever before and can get good images using much less radiation than in the past. However, placing shielding over your belly can reduce the quality of the exam if it gets into the image and in some cases can increase the overall dose from the exam. Since shielding your belly provides no benefit to your baby, it is better to not do it.

B6. Will you still shield me if I want you to?
We do not recommend using lead shielding during imaging exams. Some exams can never be done using a shield because the shield would cover up parts of the body we need to see. But, if you insist that we use a shield, we will honor your request if it is possible to do so without compromising the exam you are having.

American Association of Physicists in Medicine (AAPM)

Frequently Asked Questions
Target Audience: Parents and Guardians

C1. Why is my child not shielded now?
Shields have been used in the past, but we know more about radiation now and have imaging equipment that uses much less radiation than in the past. We have also seen that shields can cover up parts of your child's body that are important for your doctor to see.

C2. Why is my child not shielded if I am required to wear a lead apron while I am in the room with them?
Your child's doctor wants an image so that he or she can better see what is going on inside your child's body. This exposes your child to a little bit of radiation. Your doctor has thought about the benefits and risks to your child. He or she has decided that the benefit from having the information from the image is much higher than the risk from the radiation, which is very small or zero. Because you aren't being imaged, there is no need for you to get any radiation and so we give you an apron to wear to make sure that you don't get any dose.

C3. My child previously had an imaging exam where shielding was used, why the change in practice?
Patient shields have been used for more than 70 years. A lot has changed since then. We have better machines that use much less radiation. We also know more about how radiation affects the human body. Some parts of the body - like the testicles and ovaries - are much less sensitive to radiation than we used to think, thus there is no benefit from placing shields on your child.

C4. Can I ask for a shield for my child?
We do not recommend using lead shielding during imaging exams. Some exams can never be done using a shield because it would always cover parts of the body we need to see. But, if you insist that we use a shield, we will honor your request if it is possible to do so without compromising the exam your child is having.

https://www.aapm.org/org/policies/documents/CARES_FAQs_Patient_Shielding.pdf

MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

Michigan Medicine Will No Longer Be Using Shields for Patients During Diagnostic X-Ray Imaging

(Including Radiography, CT, Fluoroscopy, and Mammography)

This change is based on the recommendations of:

AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

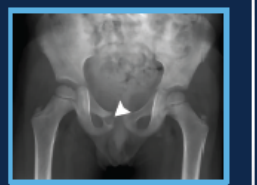
National Council on Radiation Protection and Measurements

Why Are We Not Using Shields During X-Rays?

Shields Can Block Important Anatomy

Shields block x-rays. This means that anything covered by the shield can't be seen on your x-ray images. This can lead to a missed diagnosis.

X-ray of patient wearing a shield



X-ray of the same patient without a shield - important diagnosis blocked by shield

Source: "Gonad shielding in paediatric pelvic radiography: disadvantages prevail over benefit" *Insights Imaging* (2012).

Shields Aren't Necessary for Patient Safety

Scientists have found that fetuses and reproductive organs are much less sensitive to radiation than they thought before.

Today's imaging equipment uses much less radiation than when shields were first recommended.

Questions?
Ask your technologist or scan the QR code for more information

UNIVERSITY OF MICHIGAN

American Association of Physicists in Medicine (AAPM)

The committee recommends that facilities that choose to limit the routine use of patient fetal and gonadal shielding use this document, in part or in whole, to help establish a guideline or policy that meets the needs of their individual practice. Such guidelines or policies are critically important so that any changes in practice are adopted in a consistent manner; inconsistency in the use of shields can imply to patients that not using a shield is a lapse of proper care when they have other exams where shields are used.

This document was developed by AAPM's Committee on Education and Implementation Efforts for Discontinuing the Use of Patient Gonadal and Fetal Shielding, which is a collaborative effort involving many different stakeholder organizations and individuals. The CARES committee would specifically like to recognize and thank the following contributors:

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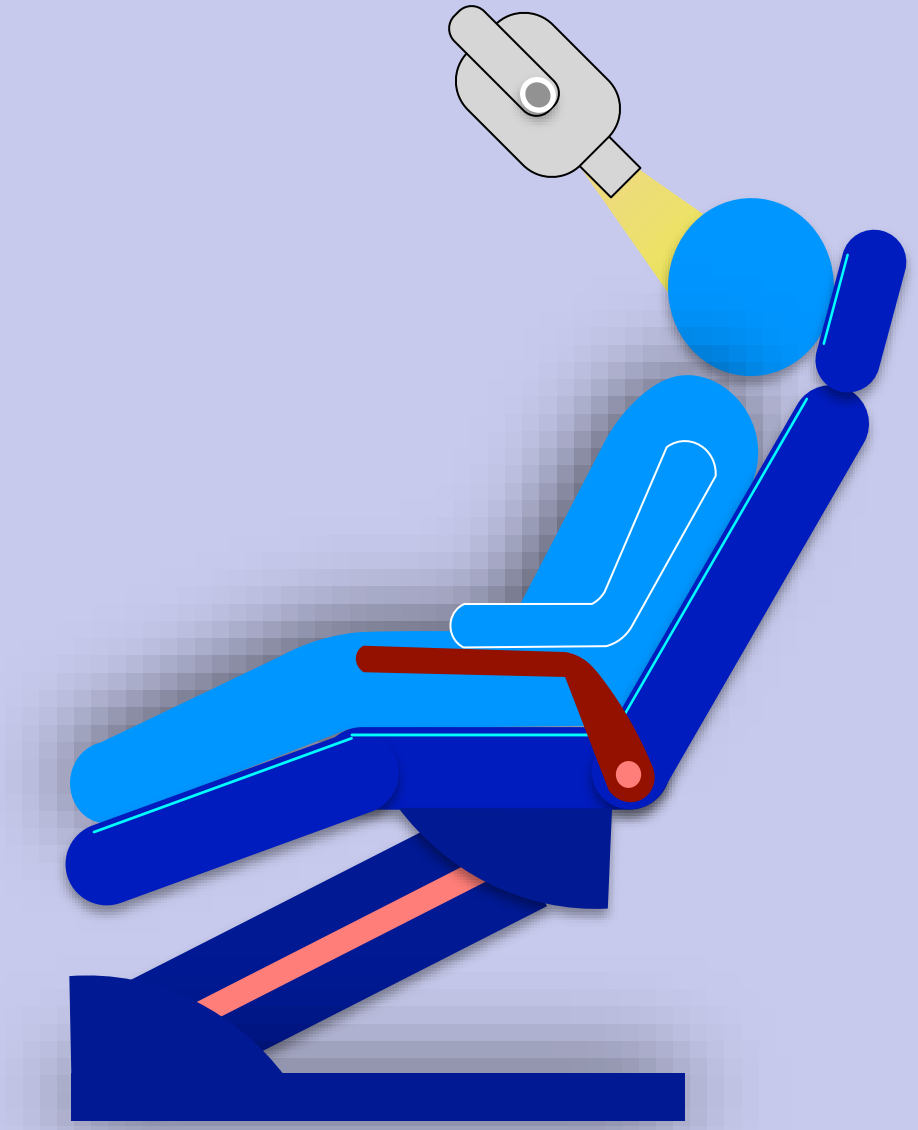
Health Physics Society
Image Gently
Image Wisely
Radiological Society of North America

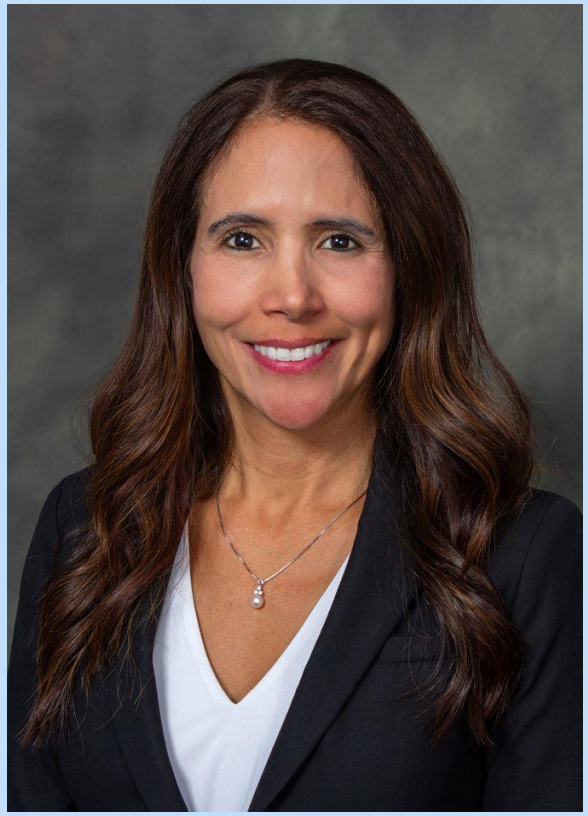
https://www.aapm.org/org/policies/documents/CARES_FAQs_Patient_Shielding.pdf

Take-Home Message

- ✓ Patient selection, digital receptors, and rectangular collimators are more effective radiation protection methods
- ✓ There is no evidence of heritable effects in humans
- ✓ Fetal dose is approx. 10,000-fold lower than threshold for fetal effects
- ✓ Thyroid dose is at least 50-fold lower than lowest doses associated with thyroid cancer risk



Graphics by Drs. Mallya & Bhula



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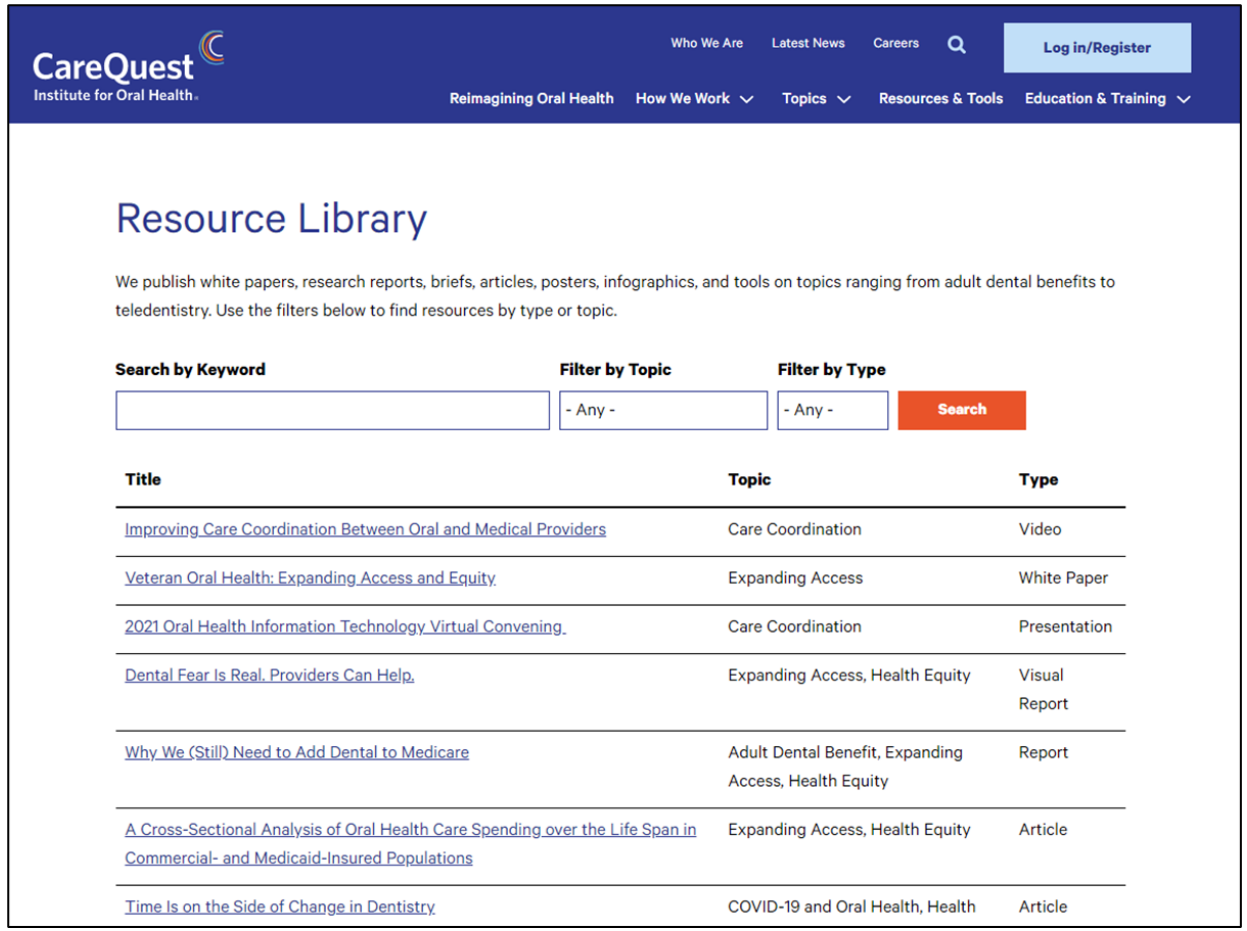
To Explore More Industry-Leading Research



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ADTA American Dental Therapy Association

Webinar Evaluation

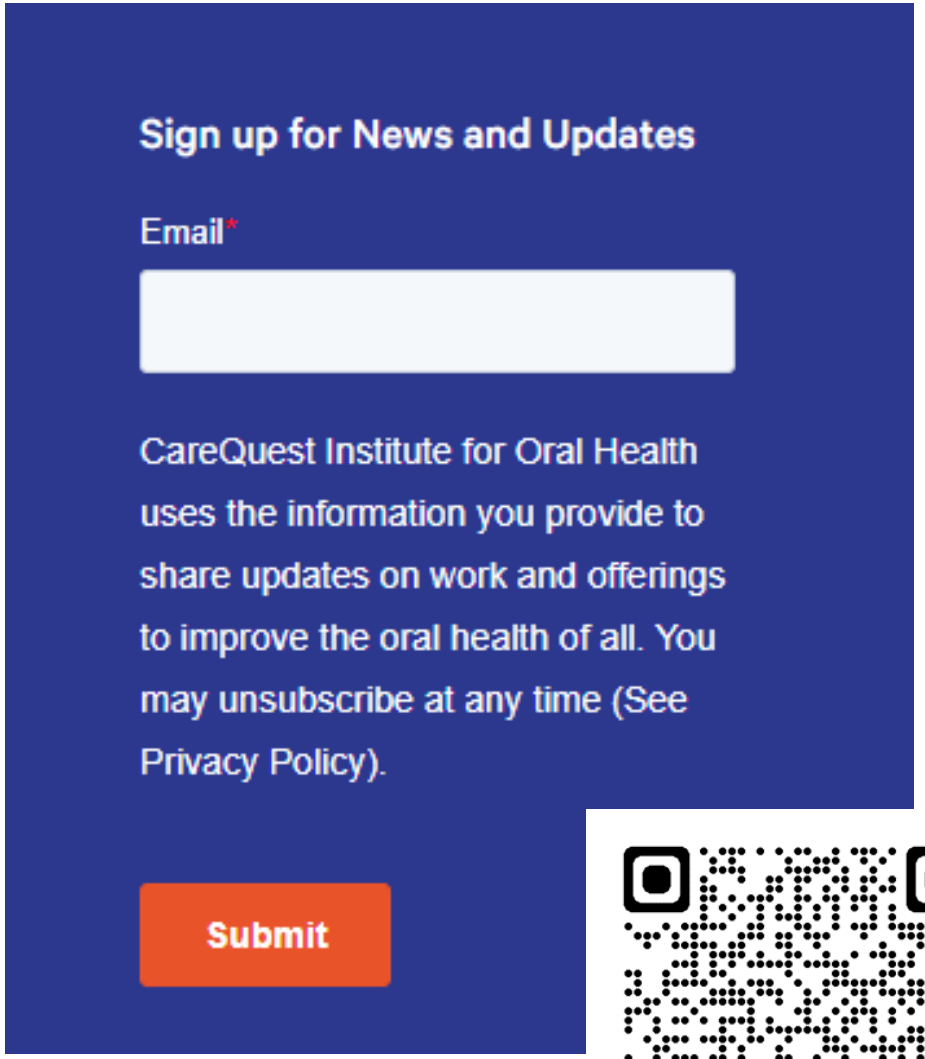
Complete the evaluation by **Friday, April 5** to receive CE credit. You will receive a link to the survey within 24 hours.

April Webinars:

Environmental Impacts of Oral Health Care: Making Sustainable Attainable **on April 11 at 7 p.m. ET**

Exploring the Myths and Misconceptions about Oral Health and Pregnancy **on April 25 at 7:30 p.m. ET**

And we invite you to take a minute to sign up for our newsletter to get more information on future webinars!



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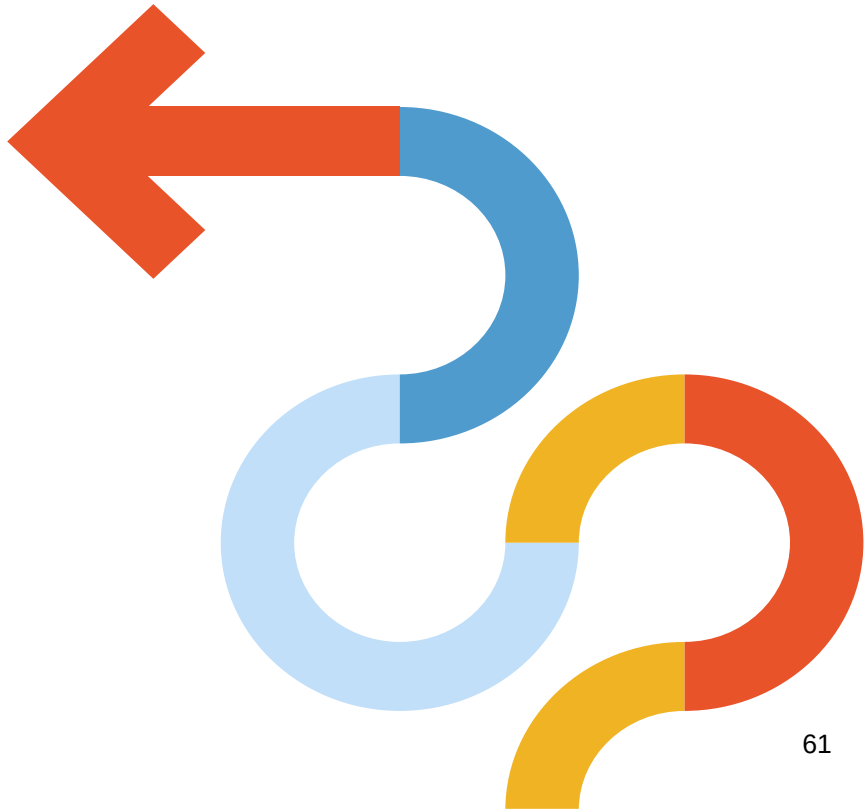

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