

American Association of Physicists in Medicine

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.

Rationale for policy: Gonadal and fetal shielding in X-ray imaging has for decades been considered consistent with the ALARA principle and therefore good practice. Given advances in technology and current evidence of radiation exposure risks, the AAPM has reconsidered the effectiveness of gonadal and fetal shielding.

Gonadal and fetal shielding provide negligible, or no, benefit to patients' health.

1) Radiation doses used in diagnostic imaging are not associated with measurable harm to the gonads or fetus. The main concern with radiation exposure to the reproductive organs has been an increased risk of hereditary effects. However, according to the 2007 Publication 103 of the International Commission on Radiological Protection (ICRP), "no human studies provide direct evidence of a radiation-associated excess of heritable disease" (5). Similarly, the American College of Obstetricians and Gynecologists (ACOG) Guidelines, with endorsement from the American College of Radiology (ACR), states that "with few exceptions, radiation exposure through radiography, computed tomography scan, or nuclear medicine imaging techniques is at a dose much lower than the exposure associated with fetal harm" (6).

2) Patient shielding is ineffective in reducing internal scatter. In medical x-ray imaging, the main source of radiation dose to internal organs that are outside the imaging field of view is x-rays that scatter inside the body. However, surface shielding covering these organs has no impact on this scatter.

The use of gonadal and fetal shielding can negatively affect the efficacy of the exam.

1) Shielding can obscure anatomy, resulting in a repeated exam or compromised diagnostic information. Shielding placed inside the imaging field of view, or shielding that moves into the imaging field of view, can obscure important anatomy or pathology, or introduce artifacts. In such cases, if the procedure is not repeated the interpreting physician may lack important diagnostic information; if it is repeated, there will be a substantial increase in dose. Evidence shows that this is a more common problem than usually assumed (7-9).

2) Shielding can negatively affect automatic exposure control and image quality. All modern X-ray imaging systems use automatic exposure control, and the presence of shielding in the imaging field of view can drastically increase X-ray output, increasing patient radiation dose and degrading image quality (10).

References:

1. ACR-SPR Practice Parameter for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation. Resolution 39 (2018).
2. RM Marsh and MS Silosky. Patient shielding in diagnostic imaging: Discontinuing a Legacy Practice (2019) AJR; 212:1-3.
3. L Yu, MR Bruesewitz, TJ Vrieze, CH McCollough. Lead shielding in pediatric chest CT: Effect of apron placement outside the scan volume on radiation dose reduction (2019) AJR;212(1):151-156.
4. KJ Strauss, EL Gingold, DP Frush. Reconsidering the Value of Gonadal Shielding During Abdominal/Pelvic Radiography (2017) JACR;14(12):1635-1636.
5. ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37.
6. Committee opinion no. 723: Guidelines for diagnostic imaging during pregnancy and lactation. Obstet Gynecol. 2017;130(4):933-934.
7. SL Fawcett and SJ Barter. The use of gonad shielding in paediatric hip and pelvis radiographs (2009) BJR; 82: 363-370.
8. MJ Frantzen, S Robben, AA Postma, et al. Gonad shielding in paediatric pelvic radiography: disadvantages prevail over benefit (2012) Imaging Insights; 3(1): 23-32.
9. MC Lee, J Lloyd, MJ Solomito. Poor utility of gonadal shielding for pediatric pelvic radiographs (2017) Orthopedics; 40(4): e623-e627.
10. ACR-AAPM-SIIM-SPR Practice Parameter for Digital Radiography. Resolution 40 (2017).

Endorsement of this Position Statement from Other Groups:

- [American College of Radiology \(ACR\)](#)

- [Australasian College of Physical Scientists & Engineers in Medicine \(ACPSEM\)](#)
- [Canadian Association of Radiologists \(CAR\)](#)
- [Canadian Organization of Medical Physicists \(COMP\)](#)
- [Health Physics Society \(HPS\)](#)
- [Image Gently](#)

Mentions in the Media:

- [AAPM clarifies x-ray shielding recommendations](#)
- [AAPM weighs in on x-ray shielding](#)
- [AAPM details policy decision on patient shielding during x-rays](#)
- [An open letter to the x-ray imaging community from the American Association of Physicists in Medicine \(AAPM\)](#)
- [ACR Endorses AAPM Position on Patient Gonadal and Fetal Shielding](#)
- [AAPM: Patient gonadal and fetal shielding unnecessary during x-rays](#)
- [AAPM: Gonadal, fetal shielding during x-ray should be 'discontinued'](#)