Canadian Association of Radiologists
L'Association canadienne des radiologistes

Canadian Association of Radiologists Position Statement

Discontinuing the Use of Gonadal and Fetal Shielding for Patients

May 13, 2021

Summary of Recommendations

Based on current scientific evidence the Canadian Association of Radiologists (CAR) recommends:

1. Discontinuing the routine use of gonadal and fetal shielding for patients undergoing abdominal or pelvic X-ray diagnostic imaging.

2. That radiologists work with their medical imaging team to advocate for the necessary changes to local institutional policies and procedures to ensure those policies are reflective of current evidence regarding shielding.

3. That if existing regulatory and/or accreditation standards require shielding, that those requirements be adhered to until standards are changed.

4. That during the period of transition to new policies and procedures, if a patient, parent, or guardian requests the use of shielding, that it be provided.

Background

Gonadal and fetal shielding has been part of routine practice for over 40 years, with many jurisdictions requiring routine use via program accreditation or regulation. Shielding practices were considered important for reducing radiation exposure to non-targeted areas of the body; gonadal and fetal shielding for X-ray imaging was considered consistent with the "As Low As Reasonably Achievable (ALARA)" principle, and therefore good practice.

In Canada, federal-level guidance on shielding is provided by Health Canada Safety Code 35, last updated in 2008. Health Canada advises the use of gonadal shields if (1) the gonads lie within, or are in close proximity to the X-ray beam; (2) the patient is of reproductive age; and (3) clinical objectives will not be compromised.[1]

These recommendations persist despite growing scientific evidence that shielding provides negligible or no benefit and carries a substantial risk of increasing the patient's radiation dose and compromising the diagnostic efficacy of an image.[2] Based on current evidence, gonadal and fetal shielding of patients during diagnostic X-ray examinations should be discontinued.

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Prior CAR Statements on Gonadal and Fetal Shielding

The CAR had previously endorsed statements advocating for the discontinuation of gonadal and fetal shielding. In October 2019, the CAR endorsed[3] the American Association of Physicists in Medicine (AAPM) position statement recommending the discontinued routine use of gonad and fetal shielding in diagnostic X-ray exams.[4] The AAPM statement was endorsed by multiple organizations representing key stakeholders in medical imaging, including the American College of Radiology[5] and Canadian Organization of Medical Physicists (COMP).[6]

In February 2021, with the support of the CAR, the CAR Journal published an invited editorial on the issue of fetal and gonadal shielding.[7] The editorial was a multi-disciplinary collaboration between radiologist Dr. Michael N. Patlas (CARJ Editor-in-Chief), two physicists (Dr. Yogesh Thakur and Dr. Thor Bjarnason) and a medical radiation technologist (Ms. Stephanie Schofield). In addition to referencing the preponderance of scientific evidence pointing to the need to discontinue the use of shielding as routine practice, the authors advocated that the radiology community engage with other professions and appropriate government and accreditation agencies to facilitate this change in practice.

Current Evidence

A substantial and growing body of peer-reviewed literature and expert consensus has shown that there is negligible, or no, benefit to patient's health from gonadal and fetal shielding when imaging is conducted using current equipment. Most recently, in January 2021, the National Council on Radiation Protection (USA) issued new guidance, emphasizing that in most circumstances the use of gonadal shields does not contribute to reduced risk of radiation exposure, and may have the unintended consequences of increased exposure and loss of valuable diagnostic information, concluding that use of gonadal shields is not justified as a routine part of radiological protection.[8]

Modern equipment emits less radiation and presents minimal harm to patients

As medical imaging technology has advanced, the radiation emitted has steadily decreased, and the exposure risk to the patient has declined accordingly.[2,9] Radiation doses used in diagnostic imaging are not associated with measurable harm to the reproductive organs or fetus. For fetal exposure, the American College of Obstetricians and Gynecologists Guidelines, with endorsement from the American College of Radiology, state 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."[10]

The main concern with radiation exposure to the reproductive organs has been the perceived risk of hereditary effects. However, multiple studies over decades of research have demonstrated no link to hereditary changes due to radiation exposure at the levels associated with X-ray-based diagnostic imaging.[9,11,12]

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

Gonadal shielding of patients during diagnostic X-ray imaging was historically used to prevent undue radiation exposure to sensitive reproductive organs and to alleviate hereditary risks.[13,14] In X-ray imaging, the main source of radiation dose to internal organs outside the imaging field is internal radiation scatter. Surface patient shielding has no impact on reducing that internal scatter,[2,15–17] thereby providing negligible benefit to patient health and safety.

Shielding compromises diagnostic efficacy and may result in repeated radiation exposure

Shielding may compromise the diagnostic efficacy of the image by obscuring anatomy and pathology while introducing artifacts to the extent that repeat imaging may be required, thereby increasing the patient's total radiation exposure. Shielding may also make it difficult to visualize pelvic organs and, if results are inconclusive, repeat exams may be needed.[18–22]

Shielding can negatively affect automatic exposure control and image quality, as the presence of shielding in the imaging field of view can drastically increase X-ray output, increasing a patient's radiation dose while degrading image quality.[23] Issues may be related to technological interference with exposure controls,[23] or technical errors related to positioning and shielding placement.[19,22,24–27]

Advocating for Changes to Practice

Regulatory and accreditation standards must be updated to reflect current evidence. The CAR is actively engaged with Health Canada, advocating for an update of Safety Code 35. The radiology community at large should engage with other medical imaging professions and appropriate government and accreditation agencies to press for the necessary regulatory changes to bring shielding practices in line with the evidence. Recently, the Canadian Association of Medical Radiation Technologists issued guidance for its membership about promoting evidence-based practice change and advocacy efforts. Until regulatory frameworks and standards are updated, radiologists, technologists, and medical physicists are bound to adhere to shielding requirements.

Although the evidence is clear, the degree to which practices around shielding are ingrained in patient preferences and workflows presents a significant barrier to implementing these changes at the local level. Medical imaging leadership teams and radiologists in each institution or clinic are encouraged to evaluate the current evidence and advocate for updates to their local policies and standards. During the transition period to new standards, some patients, or their parents/guardians, may continue to expect to be shielded. If a shield is requested, it should be provided.

The adoption of these new recommendations requires addressing the impact of this substantial change in ingrained behaviour on the part of the medical imaging team and expectations on the part of patients and their families. The prevalence of misinformation about radiation risks necessitates the development of resources to guide radiologists and radiation technologists as they work to alleviate patient concerns.[2]

Ultimately, patient engagement, inter-professional collaboration, and continuing education are key for this transition in practice.[28]

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