

5 Reasons Why Any Children's Hospital Needs a Low-Dose X-Ray Machine



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Executive Summary

For decades, traditional X-ray machines have provided essential information to health care professionals. But, these X-ray machines pose a health risk for children due to the high radiation exposure. These risks are multiplied for those children who require repeated X-rays over time.

There is an alternative: low-dose radiation systems, such as the EOS system. This Nobel-prize winning technology means:

- **Safety:** It follows the ALARA (As Low As Reasonably Achievable) principle, becoming the gold standard for the world's medical imaging community. It does so by emitting only one tenth to 1/26th the radiation of standard X-ray machines;
- **Reduced incidence of life-threatening illnesses:** Children are more vulnerable to radiation and the long-term effects of radiation. Using a low-dose radiation system reduces exposure and, thus, the incidence of life-threatening illnesses like cancer;
- **Cutting edge, world-class care:** Low-dose radiation systems like the EOS system are digital and child-friendly, providing images in less than 15 seconds for children.
- **Reduced cost to families:** Having a local low-dose radiation system avoids parents having to make a choice between their child's immediate health concerns, the family's financial situation, and the long-term health of their child. By not having to travel, they do not have to consider expensive, repeated travel and hotel costs to access this world-class care.
- **Ultra-precise diagnostic imaging:** The EOS system provides clear, 3D head-to-toe images of the front and side in a weight bearing position for more accurate measurements without needing to "stitch" images together.



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The ultra-precise, automated calculation allows for **individual three-dimensional specifications** because vertebrae are measured to under one millimeter. This means patients receive **optimal, tailored** treatments.

They are the safest systems available for the best possible care.

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Introduction

Many children need X-rays for medical diagnosis, treatment, and follow-up care. This spans a variety of conditions, such as scoliosis, a chronic condition involving an abnormal curvature of the spine.

For decades, standard X-ray machines have provided essential information to health care professionals, such as surgeons, radiologists, physiotherapists, and orthopedists.

But, these X-ray machines pose a health risk for children due to the high radiation exposure. These risks are multiplied for those children who require repeated X-rays over time.



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New, cutting-edge technology drastically reduces radiation exposure. As a direct result, the incidence of life-threatening diseases, most notably cancer, is reduced.

This report provides five reasons for a children's hospital to purchase a low-dose radiation system.

Such a system will help health care professionals make the best decisions with the most accurate information possible, thereby offering the quality health care every child and family deserves.

Reason 1: Safety - The ALARA Principle

Health care professionals must balance radiation levels and diagnostic needs for optimal patient care. The ALARA (As Low As Reasonably Achievable) principle of radiation serves as the “gold standard” for the world’s medical imaging community.¹

If a technology capable of decreasing radiation exposure exists, the medical community would do well to adopt it for all patients, especially children.

Slit scan or fan-beam technology, like the Nobel prize-winning EOS system,² meets the ALARA principle. It is at the cutting edge of medical imaging:

- The first version of the EOS system **reduced radiation exposure to one tenth** of the level of standard X-ray machines.
- The **Micro Dose** EOS system reduced this to **1/26th** of the standard X-ray machines’ radiation.

This means a huge decrease in radiation exposure for patients. The **benefits are multiplied** when more than one X-ray is needed, which is common for many conditions, such as scoliosis.



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¹ World Health Organization (WHO). (2016). Communicating radiation risks in paediatric imaging: information to support health care discussions about benefit and risk. Geneva, Switzerland: WHO.; Scoliosis Research Society: <http://www.srs.org/about-srs/quality-and-safety/position-statements/screening-for-the-early-detection-for-idiopathic-scoliosis-in-adolescents>

² 1992 Nobel Prize for Physics; EOS Imaging: <http://www.eos-imaging.com/us/company-overview-2/history.html>

Reason 2: Reduced Incidence of Life-Threatening Illnesses

Repeated radiation exposure has negative effects on the human body. It can cause **cell, tissue, and organ malfunction or, in some cases, death**. Examples of radiation effects include cancer, hair loss, cataracts and skin changes.

These risks are higher for children because their bodies are more **vulnerable** to radiation. They are also more vulnerable to certain types of cancers than adults. By virtue of their age, children have their entire lifespan to develop long-term effects from radiation exposure.³

The **risk of death is 46% higher** for women diagnosed with scoliosis than for the general population. For these women, **cancer** is the leading cause of death. The most common forms of cancer linked to radiation exposure are breast cancer, lung cancer, ovarian cancer, leukemia, and stomach and upper gastrointestinal cancers.⁴

So, following the ALARA principle, using low-dose radiation systems becomes **critical for the long-term health of our children**.

This is especially important in conditions that require repeated X-rays. For children with scoliosis under the age of 13, the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) suggests **X-rays every 6 months**⁵ until growth is complete, whether the child has had spinal surgery or is using a brace. Some children even need **5-10 X-rays per year** just for scoliosis treatment monitoring.⁶

This can amount to **42 X-rays**, on average, over their lifespan. And, this does not include X-rays for dental work, broken bones, sprains, or other needs.

³ World Health Organization (WHO). (2016). Communicating radiation risks in paediatric imaging: information to support health care discussions about benefit and risk. Geneva, Switzerland: WHO.

⁴ Knott et al. (2014). SOSORT 2012 consensus paper: Reducing x-ray exposure in pediatric patients with scoliosis. *Scoliosis*, 9(4): 1-9. <http://www.scoliosisjournal.com/content/9/1/4>; Nash et al. (1979). Risks of exposure to x-rays in patients undergoing long-term treatment for scoliosis. *Journal of Bone & Joint Surgery – American volume*, 61(3): 371–374; Ronckers et al. (2010). Cancer mortality among women frequently exposed to radiographic examinations for spinal disorders. *Radiation Research*, 174(1): 83–90.

⁵ Knott et al. (2014). SOSORT 2012 consensus paper: Reducing x-ray exposure in pediatric patients with scoliosis. *Scoliosis*, 9(4), 1-9. <http://www.scoliosisjournal.com/content/9/1/4>

⁶ EOS Pediatric Orthopaedic Imaging at Golisano Children's Hospital: <https://www.youtube.com/watch?v=SMVL-99AH50&feature=youtu.be>

Reason 3: Cutting Edge, World-Class Care

“When available, methods that use ultra-low-dose radiation should be used instead of standard radiographs.”

Vancouver, Calgary, Edmonton, Toronto, Montreal, and Halifax all have **low-dose systems**.

These machines help children's hospitals provide **cutting edge care** to meet worldwide health care recommendations.

Technology, as in the EOS system, helps children's hospitals achieve their basic mission by:

- Providing images in **less than 15 seconds**⁸, so children do not have to stand still too long;
- Providing images in a **child-friendly** machine, one that does not make “scary” noises;
- Providing digital **images instantly**, at **lower cost**⁹ for **easier access**; and
- Meeting the ALARA principles by **reducing needless radiation exposure**.

Using low-dose radiation systems is consistent with children's hospitals' desire to:

- Help children and their families live the healthiest possible lives;
- Use state-of-the-art technology; and
- Avoid causing needless harm.



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⁷ Knott et al. (2014). SOSORT 2012 consensus paper: Reducing x-ray exposure in pediatric patients with scoliosis. *Scoliosis*, 9(4), p. 7. <http://www.scoliosisjournal.com/content/9/1/4>

⁸ EOS Imaging: <http://www.eos-imaging.com/us/eos-products-2/eos-medical-low-dose-xray-system-for-orthopedic-medical-imaging.html>

⁹ World Health Organization (WHO). (2016). Communicating radiation risks in paediatric imaging: information to support health care discussions about benefit and risk (p.9). Geneva, Switzerland: WHO.

Reason 4: Reduced Cost to Families

For children and their families lucky enough to live near city with an EOS system, they can rest easy knowing they are accessing the best possible imaging.

Sadly, many families must travel to access this world-class technology. This adds a financial burden for families, on top of the stress of knowing one's child is sick and in need of treatment.

Parents must choose between having standard **X-rays with 10 times to 26 times** the radiation – and potentially causing additional health problems for their child in the long-term – or incurring travel and hotel costs to access low-dose radiation systems. These costs are multiplied when a child needs multiple X-rays per year.

“When I had an X-ray with the EOS machine [in Washington, DC], I felt very safe and comfortable.” – Kate K., 10-year-old scoliosis patient from Ottawa, Canada.

So, parents without local access to low-dose radiation systems must balance their child's immediate health care needs and comfort with the family's financial situation and their child's long-term health. An **unpleasant** position to be in.



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Reason 5: Ultra-Precise Diagnostic Imaging

Health care professionals base their treatments on diagnostics tests. The more precise the tests, the better, more targeted the treatment.

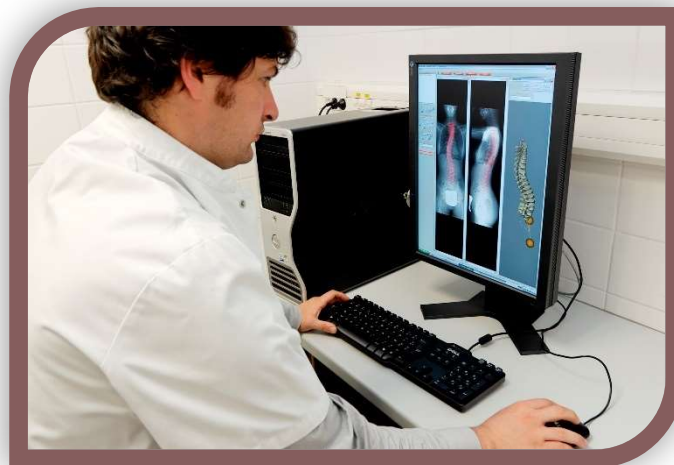
EOS systems offer superior imaging compared to standard X-ray machines by:

- Providing **clear, 3D images**;
- Allowing for a full skeleton view: **front and side, head to toe**;
- Allowing for images in a **weight bearing position** for more accurate measurements;
- Not requiring image "stitching" (combing multiple images) like standard X-ray machines; and
- Allowing for **ultra-precise, automated calculation** of clinical information.

Corrective braces can be made to **individual three-dimensional specifications** because vertebrae are measured to under one millimeter.

This means patients receive **optimal, tailored** treatments!

Taken together, this allows health care professionals to work with **accuracy and precision** for diagnosis, treatment, and follow-up.



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Conclusion

Medical imaging technology must follow ALARA principles. **EOS imaging systems and similar technologies** are the **standard of care** for pediatric medical imaging.

Ultra-low dose radiation imaging systems are the new “gold standard” because they are:

- Fast;
- Ultra-precise and automated;
- Easy to access and use; and
- Complete from head to toe.

They are the **safest systems available** for the best possible care.

About EOS Imaging

EOS Imaging, a medical company, focuses on assessment and treatment of osteoarticular conditions (i.e., hip, knee, and spine). Based in Paris, it has subsidiaries in Cambridge (USA), Montréal (Canada), and Griesheim (Germany) and operates in 51 countries. Over 100 EOS systems are in operation worldwide.¹⁰

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<https://www.youtube.com/watch?v=T1Rxyk37yHE>

¹⁰ See <http://www.eos-imaging.com/us/company-overview-2/history.html>

About Curvy Girls Ottawa

Established in 2011, the Curvy Girls Scoliosis Support Group of Ottawa (CGO) is a volunteer-run, non-profit organization with one teen leader and one adult leader. CGO's mission consists of raising awareness of scoliosis through education, especially the importance of early detection and treatment. The group also endeavours to create an atmosphere of sharing and friendship. CGO strives to empower pre-teens and teens with scoliosis, so they reach out and support each other within the community.

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About Emilie Ryan Copywriting

Emilie Ryan Copywriting specializes in B2B (business-to-business) white papers and case studies for the health industry. Prof. Milena Parent, Ph.D., and Dr. John Kowal, Ph.D., founded the organization in 2016 to help health-based organizations tell their story, reach their clientele, promote their products and services, and promote wellbeing and active, healthy living.

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