Pediatric X-ray

What is a pediatric x-ray?



An x-ray exam is a noninvasive medical test that helps doctors diagnose and treat medical conditions. X-ray exams use a small dose of ionizing radiation (http://www.radiologyinfo.org) to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

An x-ray exam may be performed on newborns, infants and older children.

What are some common uses of the procedure?

X-ray exams are used to help diagnose a wide variety of injuries and illnesses in children. It is often the first type of imaging used to identify sources of pain, evaluate traumatic injuries, and *locate a foreign body.*

X-rays are used throughout the body. Chest x-ray (https://www.radiologyinfo.org/en/info/chestrad) is the most commonly used imaging exam for evaluating the chest. It can help diagnose and assess:

- pneumonia
- tumors
- airway disease
- birth abnormalities
- trauma to blood vessels or lungs
- foreign bodies that have been swallowed or inhaled.

Abdominal x-ray (https://www.radiologyinfo.org/en/info/abdominrad) is often the first exam used to evaluate the source of acute pain in the abdominal region and/or lower back. It may be used to evaluate unexplained nausea and vomiting. X-ray is well-suited for visualizing:

- gallstones (https://www.radiologyinfo.org/en/info/gallstones)
- kidney stones (https://www.radiologyinfo.org/en/info/stones-renal)
- intestinal blockages
- perforation of the stomach or intestine
- swallowed foreign objects.

In the pelvic region, x-rays can help detect tumors, evaluate for stones in the urinary tract (https://www.radiologyinfo.org/en/info/stones-renal) and assess pelvic bone disease.

Bone x-rays (https://www.radiologyinfo.org/en/info/bonerad) are used to diagnose fractures or dislocations and guide surgeries such as spine repair/fusion. They also help assess:

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- injury
- infection
- abnormal bone growths and bony changes seen in metabolic conditions
- bone cancer
- the location of foreign objects in soft tissues around or in bones.

Skull x-rays have largely been replaced with newer technologies such as computed tomography (CT) (https://www.radiologyinfo.org/en/info/pedia-ct) and magnetic resonance imaging (MRI) (https://www.radiologyinfo.org/en/info/pediatric-mri) . However, skull x-rays are still helpful for detecting fractures and other conditions, such as:

- birth abnormalities
- infection
- foreign bodies
- tumors
- sinus disease
- metabolic and endocrine disorders that cause bone defects of the skull.

X-rays use contrast material (http://www.radiologyinfo.org) to help diagnose a variety of conditions in both the upper and lower intestinal tract. Upper gastrointestinal tract radiography (https://www.radiologyinfo.org/en/info/uppergi) , also called an upper GI exam, looks at the esophagus (http://www.radiologyinfo.org) , stomach and first part of the small intestine (duodenum). A special form of x-ray called fluoroscopy and a swallowed contrast material such as barium are used to produce the images.

Fluoroscopy (http://www.radiologyinfo.org) uses x-rays to see internal organs in motion. When the upper GI tract is coated with barium, the radiologist can view and assess the anatomy and function of the esophagus, stomach and duodenum.

An upper GI exam helps evaluate digestive function and can detect:

- reflux, a backward flow of stomach acid into the lower end of the esophagus
- ulcers (http://www.radiologyinfo.org)
- tumors
- inflammation of the esophagus, stomach and duodenum
- hiatal hernias
- scarring
- blockages
- abnormalities of the muscular wall of GI tract
- anatomical problems such as intestinal malrotation (a twisting of a baby's intestine).

An x-ray exam that evaluates only the pharynx (http://www.radiologyinfo.org) and esophagus is called a barium swallow. This is performed for patients with feeding difficulties or those who may have food or liquid in their lungs. A speech pathologist, a specialist who treats communication and swallowing problems, is often involved in the exam.

Lower intestinal tract radiography (https://www.radiologyinfo.org/en/info/lowergi) , also called a lower GI or barium enema exam, uses fluoroscopy and contrast material to examine the large intestine, or colon. A mixture of barium and water is introduced through the rectum (http://www.radiologyinfo.org) . This helps the doctor identify abnormalities of the lower intestine. A doctor may order a lower GI exam to detect:

- benign tumors (such as polyps)

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- cancer
- ulcerative colitis (http://www.radiologyinfo.org) (inflammatory bowel disease)
- Hirschsprung disease (a children's disease characterized by abnormalities of the large intestine).

On occasion, some patients are given other forms of contrast to swallow, usually containing iodine. These alternative contrast materials may be used if the patient has recently had GI tract surgery or has allergies to other contrast materials. The radiologist (http://www.radiologyinfo.org) will determine which type of contrast material to use. *For more information, see the Contrast Materials (https://www.radiologyinfo.org/en/info/safety-contrast) page.*

How should we prepare for the x-ray exam?

Your child should wear comfortable, loose-fitting clothing to the exam. They may be given a gown to wear during the procedure.

Metal objects including jewelry, eyeglasses, hearing aids, non-permanent retainers and hairpins may affect the x-ray images. Be sure to remove them prior to your child's exam.

Your child may be asked not to eat or drink anything for several hours before an upper GI exam. This is because food and drink can dilute the contrast material. Also, the feeling of being full may prevent the patients from voluntarily drinking the contrast material.

Sedation and anesthesia are rarely needed for x-ray exams.

Tell your doctor about any medications your child is taking and if they have any allergies.

Also, tell your doctor about any recent illnesses or other medical conditions your child may have. Mention any history of asthma, diabetes, kidney disease or thyroid problems.

Adolescent females may be asked to provide urine for a pregnancy test if they are sexually active. This is so that a fetus is not inadvertently exposed to radiation.

What does the x-ray equipment look like?

The equipment used during an x-ray exam varies based on the part of the body being imaged.

In most cases, the equipment consists of an x-ray tube that hangs over an exam table. A drawer under the table holds the x-ray film or image recording plate. Sometimes, the x-ray is taken with the patient standing up.

For exams that use fluoroscopy, the equipment typically consists of a table, one or two x-ray tubes and television-like monitors inside and outside the exam room. Fluoroscopy converts x-rays into video images. It is used to watch and guide progress of the procedure. The video is produced by the x-ray machine and a detector that hangs over an exam table.

Children in the hospital who cannot be brought to the x-ray room can be x-rayed at their bedside with a small, portable x-ray machine. The x-ray tube is connected to a flexible arm that is extended over the patient while an x-ray film holder or image recording plate is placed beneath the patient.

How does the procedure work?

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. The technologist carefully aims the x-ray beam at the area of interest. The machine produces a small burst of radiation that passes through your body. The radiation records an image on photographic film or a special detector.

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Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue (muscle, fat, and organs) allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue shows up in shades of gray, and air appears black.

Until recently, x-ray images were stored on large film sheets (much like a large photo negative). Today, most images are digital files that are stored electronically. These stored images can be easily and quickly accessed to help diagnose and treat disease.

How is the procedure performed?

The technologist will position the child on the x-ray table. A guardian can usually accompany the child into the x-ray room. The guardian will be asked to wear a lead apron.

The x-ray technologist will position the child, and then walk behind a window or into the next room to activate the x-ray machine. The child must remain still to reduce the possibility of blurring the image. Older children will be asked to hold their breath and stay still for a few seconds during the x-ray. Infants may need assistance to keep still.

The technologist may ask the child to lie on their side or to stand up for additional images.

When the examination is complete, the technologist may ask you to wait until the radiologist confirms they have all the necessary images.

The entire x-ray exam, from positioning to obtaining and verifying the images, is usually completed within 15 minutes. The actual exposure to radiation is usually less than a second.

Procedures differ for examining the upper and lower intestinal tracts. *Please see Radiography - Upper GI Tract (https://www.radiologyinfo.org/en/info/uppergi) and Radiography - Lower GI Tract (https://www.radiologyinfo.org/en/info/lowergi) pages for details.*

What will my child experience during and after the procedure?

X-ray exams are generally painless, fast and easy.

Children may experience discomfort from the cool temperature in the exam room or the hardness of the x-ray table. They may find that the positions they need to hold are uncomfortable or painful, especially if they have an injury.

The technologist will help your child find the most comfortable position possible to ensure the best quality images are captured.

Generally, after an x-ray exam, your child can return to their normal activities. If your child received some form of sedation for the exam, you and your child will stay in the department for a recovery period. You will also be given instructions on limiting any activity for the day.

Who interprets the results and how do we get them?

A radiologist (https://www.radiologyinfo.org/en/info/article-your-radiologist) , a doctor trained to supervise and interpret radiology examinations, will analyze the images. The radiologist will send a signed report to your primary care or referring physician (http://www.radiologyinfo.org) who will discuss the results (https://www.radiologyinfo.org/en/info/all-about-your-radiology-report) with you.

X-ray exam images can be available almost immediately for review by your radiologist.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up

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exams are often the best way to see if treatment is working or if a problem needs attention.

What are the benefits vs. risks?

Benefits:

- X-rays are painless and minimally invasive.
- Radiology exams can often provide enough information to avoid more invasive procedures.
- X-ray equipment is relatively inexpensive and widely available in emergency rooms, doctors' offices, ambulatory care centers, nursing homes, and other locations. This makes it convenient for both patients and doctors.
- Because x-ray imaging is fast and easy, it is particularly useful in emergency diagnosis and treatment.
- No radiation stays in your body after an x-ray exam.
- X-rays usually have no side effects in the typical diagnostic range for this exam.

Risks

- There is a very small but statistically significant risk of cancer over a lifetime in children who receive excessive exposure to radiation. Radiology equipment settings are optimized to use the lowest possible radiation dose necessary to produce quality images. Exams are performed only for appropriate indications.
- The effective radiation dose for these procedures varies. *See the Children and Radiation Safety (https://www.radiologyinfo.org/en/info/safety-rad-children) page for more information.*
- The risk of serious allergic reaction to iodine contrast materials is rare in children and almost always mild. Radiology departments are well-equipped to deal with them.
- There is always is a risk of complications from general anesthesia or sedation. Every measure will be taken to protect your child, including close monitoring.

A Word About Minimizing Radiation Exposure

Doctors take special care during x-ray exams to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection organizations continually review and update the technique standards radiology professionals use.

Modern x-ray systems minimize stray (scatter) radiation by using controlled x-ray beams and dose control methods. This ensures that the areas of your body not being imaged receive minimal radiation exposure.

What are the limitations of pediatric x-ray?

X-ray exams are a useful first step in the imaging workup. However, the images are not as detailed as other exams such as CT or MRI. Further imaging exams may be necessary to clarify the results or to look for abnormalities not visible on the x-ray.

Working together, your primary care physician or pediatrician and the radiologist will decide which type of exam is best for your child.

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