



Policy Library

Recommendations for Imaging in Children in Non-Dedicated Paediatric Centres

Version: 1.0
Approved by: Council
Date of approval: August 2012
Date for review: August 2015

1. INTRODUCTION

1.1 Purpose

The purpose of this document is to provide information to assist radiologists in supplementing adult imaging protocols, and to highlight when an imaging protocol needs to be changed for children (patients <16 years).

1.2 Scope

The scope of this document is to provide guidance on the performance of paediatric imaging for radiology practices and hospital departments that are not dedicated paediatric centres. It also provides radiologists and radiology practices with a list of useful references that complement the recommendations contained within this guide.

1.3 Background

Most radiology practices and hospital departments perform some paediatric imaging; however the majority of their patients are likely to be adults. Under the auspice of its Paediatric Imaging Reference Group, the College has produced this document in order to support a consistent approach to paediatric imaging so that all practices are aware of the particular issues that need to be addressed when imaging children.

The Alliance for Radiation Safety in Paediatric Imaging, of which the College is a member body, began as a committee within the Society for Paediatric Radiology in late 2006. This resulted in the Image Gently Campaign whose goal is to change practice by increasing awareness of the opportunities to promote radiation protection in the imaging of children and raise awareness of the opportunities to lower radiation dose in the imaging of children.

This guidance document is a College strategy that supports this goal, but is specific to the Australian and New Zealand context.

The position statement will be reviewed in a 3 yearly cycle.

1.4 Methodology

The Paediatric Imaging Reference Group (PIRG) was formed to provide a forum for discussion and provision of advice to the College Council, College members and external enquiries on issues relating to Paediatric Imaging. It does this by identifying and recommending mechanisms by which standards relating to Paediatric Imaging may be promoted and implemented through the College membership and the health sector.

The PIRG consists of radiologists with a particular interest in paediatric imaging, and is representative of all states and territories across Australia and New Zealand. The PIRG also represents rural and remote regions as well as both the public and private sectors.

In developing the document the PIRG undertook a critical review of various protocols and guidelines used within Paediatric Imaging. This resulted in a final list of recommendations to assist others in making decisions about appropriate use of paediatric imaging. This document was then circulated amongst the PIRG with the final version being determined by consensus. This final version was then considered by the Standards of Practice and Accreditation Committee of the College before being formally considered, approved and endorsed by the College Council.

2. DEFINITIONS

In the Paediatric Imaging Guidelines:

College means The Royal Australian and New Zealand College of Radiologists

Member means a member of the College

PIRG means the Paediatric Imaging Reference Group of the College

3. POLICY STATEMENT

3.1 General Principles

Imaging in children should be specifically tailored so that required information is obtained with the fewest images and least radiation with the aim of performing the most appropriate test the first time.

It is strongly recommended that technical staff liaise with radiologists prior to taking plain x-rays if these are performed infrequently at the practice or if there are any concerns regarding a particular request. It is strongly recommended that technical staff liaise with radiologists prior to performing Computed Tomography (CT).

For CT, it is recommended that the radiologist consider whether ultrasound or Magnetic Resonance Imaging (MRI) could be performed as an alternative.

As a principle, for plain x-rays and CT the overall coverage of the imaging should be limited to the area of interest.

3.2 Anaesthesia, Sedation and Other Techniques

It is important not to perform a study, especially CT, unless it is likely that the child will be either cooperative enough to remain still or can be satisfactorily immobilised.

General Anaesthesia and Sedation require the appropriate medical and nursing expertise, monitoring equipment and recovery facilities as outlined in the Position Statement on the Use of Sedation and Anaesthesia in Paediatric Imaging.

3.2.1 Important Principles

- Some movement artefact may be acceptable depending on the clinical indication for the scan. The technician should check with the radiologist, before rebooking or repeating the scan.
- If the child is not cooperating the study should be quickly terminated.
- Only use IV contrast when absolutely necessary.

3.2.2 For CT

- Do not perform a routine noncontrast scan if a contrast scan is required.
- Noncontrast studies can usually be performed without general anaesthesia on a multislice CT scan if adequate immobilisation can be utilised.
- A contrast CT can usually be performed on a child >6 years without anaesthesia. A contrast CT <6 years and especially <3 years will usually require general anaesthesia. The use of Emla or angel cream 30 mins prior to cannulation for a contrast scan will improve compliance even in children 3-6 years.
- If general anaesthesia is required, strongly consider the use of MRI.
- The use of bismuth or other radiation shielding devices should only be considered when staff are trained in their use to ensure that a reduction in radiation dose is achieved.

3.2.3 For MRI

- Perform the most important sequences first.
- Age <3 months: a dedicated beanbag can reliably be used to immobilise a patient for approximately 30 minutes for a brain scan.
- Age 3 months – 4/6 years: usually requires general anaesthesia. Depending on availability and urgency, a noncontrast CT should be considered if appropriate.
- Age 4/6 – 8/10 years: usually can have an MRI with appropriate patient preparation (see other techniques).
- Age >10 years: can usually be performed as for an adult.

3.2.4 Other Techniques:

It is often possible to achieve satisfactory patient cooperation in a child that would otherwise have required a general anaesthetic with appropriate patient and parent preparation. The following techniques should be considered:

- Explanation and Information pamphlets (see Inside Radiology link www.insideradiology.com.au), which can be child or parent orientated.
- Session playing with model of CT or MRI unit.
- Session on Mock CT or MRI where available.
- Short instructional videos that can be web based.
- Tour of CT or MRI prior to scan.
- Facility to listen to favourite music or watch DVD during scan.

3.3 Plain X-Rays

3.3.1 Skull X-Rays for Plagiocephaly

Requires anteroposterior (AP), Lateral, Townes and Basal views.

The basal view is often omitted as it is very difficult to obtain in children; however it is important in determining skull deformity.

3.3.2 Cervical Spine X-Ray for Trauma

As a routine omit the oblique views.

<4 years the odontoid view is not contributory and should be omitted unless the Medical Imaging Technologist (MIT) feels the patient is likely to be compliant.

3.3.3 Chest X-Ray

As a routine the lateral view is usually not performed. The AP should be non-rotated and inspiratory.

3.3.4 Abdominal X-Ray

As a routine the erect view should not be performed. Fluid levels are not useful in children occurring more commonly in the absence of obstruction. An erect chest x-ray should be performed if free intraperitoneal air is the clinical question. For children aged 0-24 months a shoot through lateral or decubitus film is substituted.

3.3.5 Pelvic and Hip X-Ray

X-Ray of the hip in a child requires an AP view of the Pelvis to assess the other hip and look for an effusion and a lateral view of the symptomatic side.

The exception is for Developmental Dysplasia of the Hip (DDH) where, as a routine, an AP view is only required. It is important that the AP is not rotated, as this will effect the assessment of the acetabulum for dysplasia.

Gonadal shielding in boys should always be used because important anatomical structures will not be obscured. In girls, the experience of the MIT should dictate its use.

3.3.6 Foot X-Ray for “clubfoot”

The AP view should be performed “weight bearing” to assess for varus/valgus deformity.

3.4 Ultrasound

3.4.1 Renal Ultrasound

- Record 3 coronal, 3 sagittal and 3 transverse images improving the assessment for renal scarring.
- If collecting system dilation is present, comment in the report on the calyceal dilation and measure the pelvic dilation transversely as the pelvis leaves the renal parenchyma. If the ureter is dilated, state whether the dilatation is proximal or distal.
- If pelvicalyceal dilatation is present, do not routinely recommend an Micturating Cystourethrogram (MCU), as the presence of vesicoureteric reflux (VUR) usually does not effect patient management. Recommending an MCU may make it difficult for the referrer to not perform an MCU.

3.4.2 Hip Ultrasound for Assessment of Dysplasia

There are many pitfalls to Hip ultrasound in dysplasia and it is not recommended that it is performed unless the sonographer/radiologist is experienced in the technique. When reporting Hip Ultrasound, describe the presence and severity of acetabular dysplasia, the stability of the joint and whether the hip is enlocated, subluxed or dislocated.

3.5 Fluoroscopy

For all fluoroscopic procedures satisfactory patient immobilisation, appropriate collimation, minimal fluoroscopic time and a minimal number of exposures should be performed. Captured fluoroscopic images would be preferable to keep the dose level down.

3.5.1 MCU

The MCU is used most commonly for diagnosing VUR and, more rarely, posterior urethral valves in boys. The significance of VUR is controversial. Most imaging guidelines do not routinely recommend performing an MCU following a urinary tract infection. In view of the radiation dose and associated trauma it is reasonable to discuss the procedure with the referring doctor to determine that a positive finding of VUR will alter the child's management.

3.6 CT

Both pre and postcontrast scans should be avoided if possible. The KVp should be reduced to 80-100. See the section on anaesthesia, sedation and other techniques for appropriate patient immobilisation techniques.

3.6.1 CT Brain

If possible perform an MRI, which is more sensitive to most pathologies and does not use radiation. When a CT of the brain is performed:

- Tilt the gantry to avoid the orbits.
- Use 100KVp or less and Automated Exposure Control.
- Use a narrow window (80) to view the brain.

3.6.2 CT Abdomen

Abdominal CT without IV contrast is usually not useful and should not be performed if IV access cannot be achieved.

CT of the abdomen for nonspecific abdominal pain is usually non-contributory. If a good quality abdominal ultrasound is normal, specialist referral is more appropriate.

4. USEFUL REFERENCES

The following list provides useful references for radiologists, radiology practices and hospital departments which engage in paediatric imaging. These references are only a starting point.

4.1 General

Digital Radiography Safety Checklist – Safety Steps to Do and Verify for your paediatric patient, Image Gently website (<http://www.pedrad.org/associations/5364/ig/index.cfm?page=766>)

4.2 Patient Preparation

Inside Radiology website (www.insideradiology.com.au)

Pediatr Radiol (2008) 38:271-279 DOI 10.1007/s00247-007-0704-x
Reviewing the process of preparing children for MRI Leanne M. Hallowell & Shari E. Stewart & Cicero T. de Amorim e Silve & Michael R. Ditchfield

4.3 Anaesthesia and Sedation

RANZCR Position Statement on the Use of Anaesthesia or Sedation in Paediatric Imaging

Guidelines on Sedation and/or Analgesia for Diagnostic and Interventional Medical, Dental or Surgical Procedures

Australian and New Zealand College of Anaesthetists. Statement on anaesthesia care of children in healthcare facilities without dedicated paediatric facilities

Australian and New Zealand College of Anaesthetists. Recommendations on minimum facilities for safe administration of anaesthesia in operating suites and other anaesthetising locations

4.4 Radiation in Children

Image Gently website (www.imagegently.com)

CT Dose Reduction and Dose Management Tools: Overview of Available Options
Cynthia H. McCollough, Michael R. Bruesewitz, James M. Kofler Jr, March 2006
RadioGraphics, 26, 503-512.

Paediatr Radiol (2011) 41:951-952 DOI 10.1007/s00247-011-2159-3
Rebalancing the risks of Computed Tomography and Magnetic Resonance imaging S. Bruce Greenberg

4.5 Ultrasound

Paediatric Sonography. M. Siegel. 4th Edition

4.6 Micturating Cystourethrogram and Vesicoureteric Reflux

Diagnosis and Management of an Initial UTI in Febrile Infants and Young Children the Subcommittee on Urinary Tract Infection
Paediatrics 2011;128:e749; originally published online August 28, 2011; DOI: 10.1542/peds.2011-1332

Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months
Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management
Paediatrics 2001;128;295; originally published online August 2001; DOI:10.1542/peds.2011-1330

National Institute for Health and Clinical Excellence. Urinary Tract Infection in Children. London. NIC, 2007. Available from: <http://guidance.nice.org.uk/CG54>

Pennesi M., Travan L., Peratoner L., et al. Is antibiotic prophylaxis in children with vesicoureteral reflux effective in preventing pyelonephritis and renal scars? A randomised, controlled trial. Paediatrics, 2008; 121(6). Available at: www.paediatrics.org/cgi/content/full/121/6/e1489

4.7 Imaging Guidelines

Diagnostic Imaging Pathways – Government of Western Australia
www.imagingpathways.health.wa.gov.au