Diagnostic Imaging Pathways - Paediatric, Magnetic Resonance Imaging

Population Covered By The Guidance

This pathway provides guidance on general Magnetic Resonance Imaging in children.

Date reviewed: June 2017

Date of next review: June 2020

Published: December 2017

Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

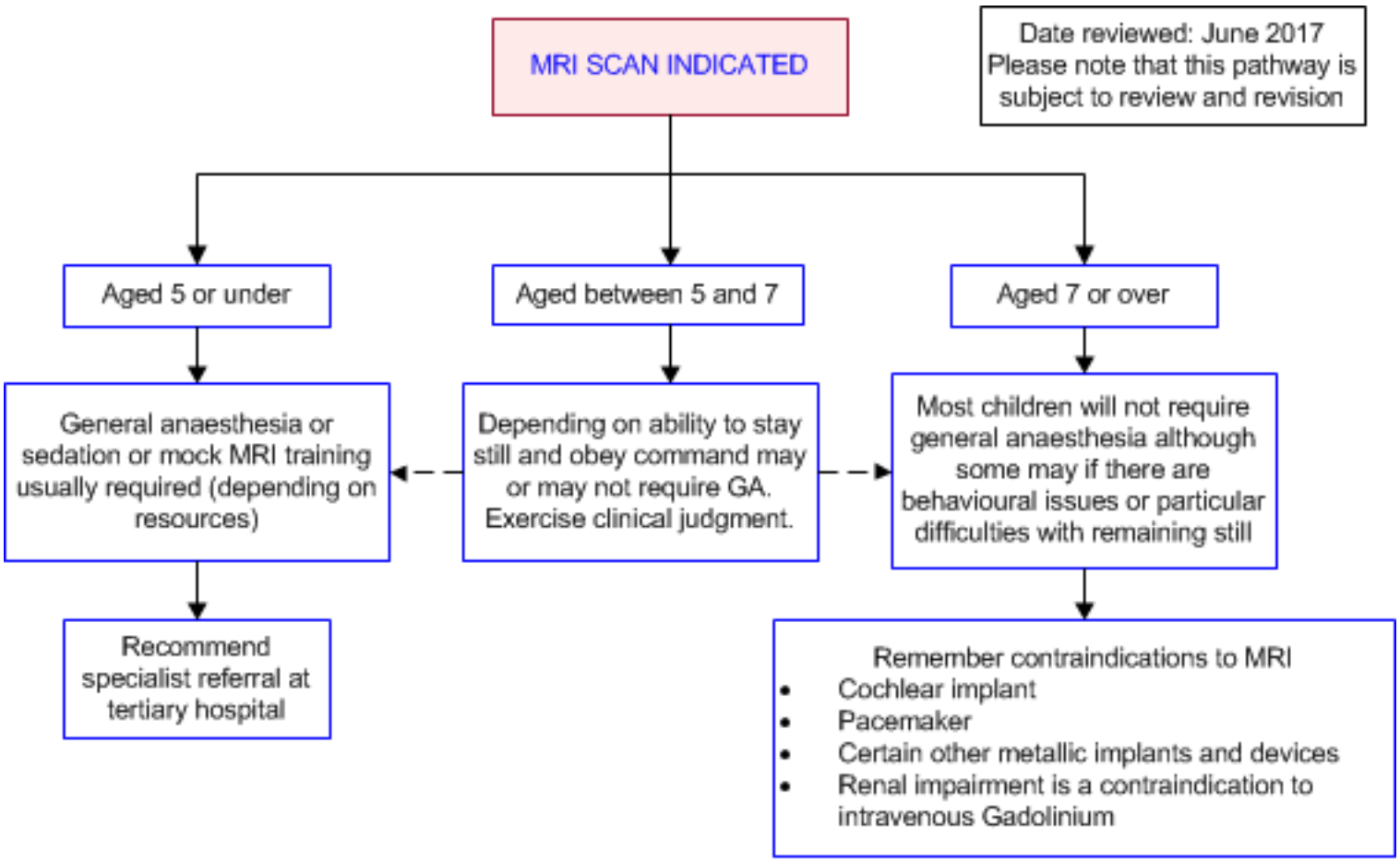

Image Gallery

Note: Images coming soon

Magnetic Resonance Imaging (MRI)

- MRI scans are time consuming and often take 30mins and require the patient to remain still for up to 5 mins at a time during the scan
- Sedation or anaesthesia is required in many infants and younger children less than 6 years old
- Feed and wrap techniques can be used to alleviate the need for sedation or anaesthesia in children up to 3 months of age

- MRI is contraindicated in children with some implanted devices including certain cochlear implants, brain or spinal stimulators or pacemakers

Magnetic Resonance Imaging (MRI)

- MRI scans are time consuming, generally taking 15-30 minutes but sometimes up to one hour, and require the patient to keep still for a successful scan. Given the confined space, the need to stay still, the noise and sometimes the need for intravenous access, it is not surprising that some children feel significant levels of anxiety 1-3
- General anaesthesia or sedation is often required for children under 6 years of age. However, this age is arbitrary and individual assessment is required. If an older child has learning or behavioural difficulties they may still require general anaesthesia or sedation 4-5
- General anaesthesia or sedation require more advanced equipment, additional appointment time and highly trained staff 1, 4
- The use of play therapy and mock MRI scanners can reduce the need for sedation and general anaesthesia, particularly in the 3-8 age group 1, 6
- Other techniques, such as feed and wrap (where sleep is induced through warmth and feeding), can be successfully used in babies under 12 weeks of age 1, 7
- There are risks from the effect of the powerful magnets within the MR suite and MRI is contraindicated in patients with some implanted devices including certain cochlear implants, brain or spinal stimulators or pacemakers 8, 9
- Whilst anaphylactic reactions to gadolinium based contrast agents for MRI are rare, there is an association with the development of nephrogenic systemic fibrosis (NSF) in patients with chronic renal impairment. Recent studies have also shown gadolinium accumulation in brain and body tissues after repeated doses of some forms of gadolinium based contrast agents 8, 10

References

Date of literature search: May 2017

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

1. Noonan S, Spuur K, Nielsen S. **Immobilisation in Australian paediatric medical imaging: A pilot study.** Radiography (Lond). 2017;23(2):e34-e40. (Level IV evidence). View the reference
2. Hallowell LM, Stewart SE, de Amorim ESCT, Ditchfield MR. **Reviewing the process of preparing children for MRI.** Pediatr Radiol. 2008;38(3):271-9. (Level III evidence). View the reference
3. Chou IJ, Tench CR, Gowland P, Jaspan T, Dineen RA, Evangelou N, et al. **Subjective discomfort in children receiving 3 T MRI and experienced adults' perspective on children's tolerability of 7 T: a cross-sectional questionnaire survey.** BMJ Open. 2014;4(10):e006094. (Level III evidence). View the reference
4. Edwards AD, Arthurs OJ. **Paediatric MRI under sedation: is it necessary? What is the evidence for the alternatives?** Pediatr Radiol. 2011;41(11):1353-64. (Review article). View the reference
5. Barton K, Nickerson JP, Higgins T, Williams RK. **Pediatric anesthesia and neurotoxicity: what the radiologist needs to know.** Pediatric Radiology. 2017:1-6. (Review article). View the reference
6. Carter AJ, Greer ML, Gray SE, Ware RS. **Mock MRI: reducing the need for anaesthesia in**

children. Pediatr Radiol. 2010;40(8):1368-74. (Level IV evidence). View the reference

7. Antonov NK, Ruzal-Shapiro CB, Morel KD, Millar WS, Kashyap S, Lauren CT, et al. **Feed and Wrap MRI Technique in Infants.** Clin Pediatr (Phila). 2016:e20. (Level III evidence). View the reference
8. Crownover BK, Bepko JL. **Appropriate and safe use of diagnostic imaging.** Am Fam Physician. 2013;87(7):494-501. (Review article). View the reference
9. Cogbill TH, Ziegelbein KJ. **Computed tomography, magnetic resonance, and ultrasound imaging: basic principles, glossary of terms, and patient safety.** Surg Clin North Am. 2011;91(1):1-14. (Review article). View the reference
10. Abujudeh HH, Kaewlai R, Kagan A, Chibnik LB, Nazarian RM, High WA, et al. **Nephrogenic systemic fibrosis after gadopentetate dimeglumine exposure: case series of 36 patients.** Radiology. 2009;253(1):81-9. (Level IV evidence). View the reference

Information for Consumers

Information from this website	Information from the Royal Australian and New Zealand College of Radiologists' website
Consent to Procedure or Treatment Radiation Risks of X-rays and Scans Magnetic Resonance Imaging (MRI)	Magnetic Resonance Imaging (MRI) Radiation Risk of Medical Imaging for Adults and Children Making Your Child's Test or Procedure Less Stressful

File Formats

Some documents for download on this website are in a Portable Document Format (PDF). To read these files you might need to download Adobe Acrobat Reader.

Legal Matters