

Diagnostic Imaging Pathways - Paediatric, Knee Pain

Population Covered By The Guidance

This pathway provides guidance on imaging children with knee pain.

Date reviewed: July 2014

Date of next review: 2017/2018

Published: July 2014

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

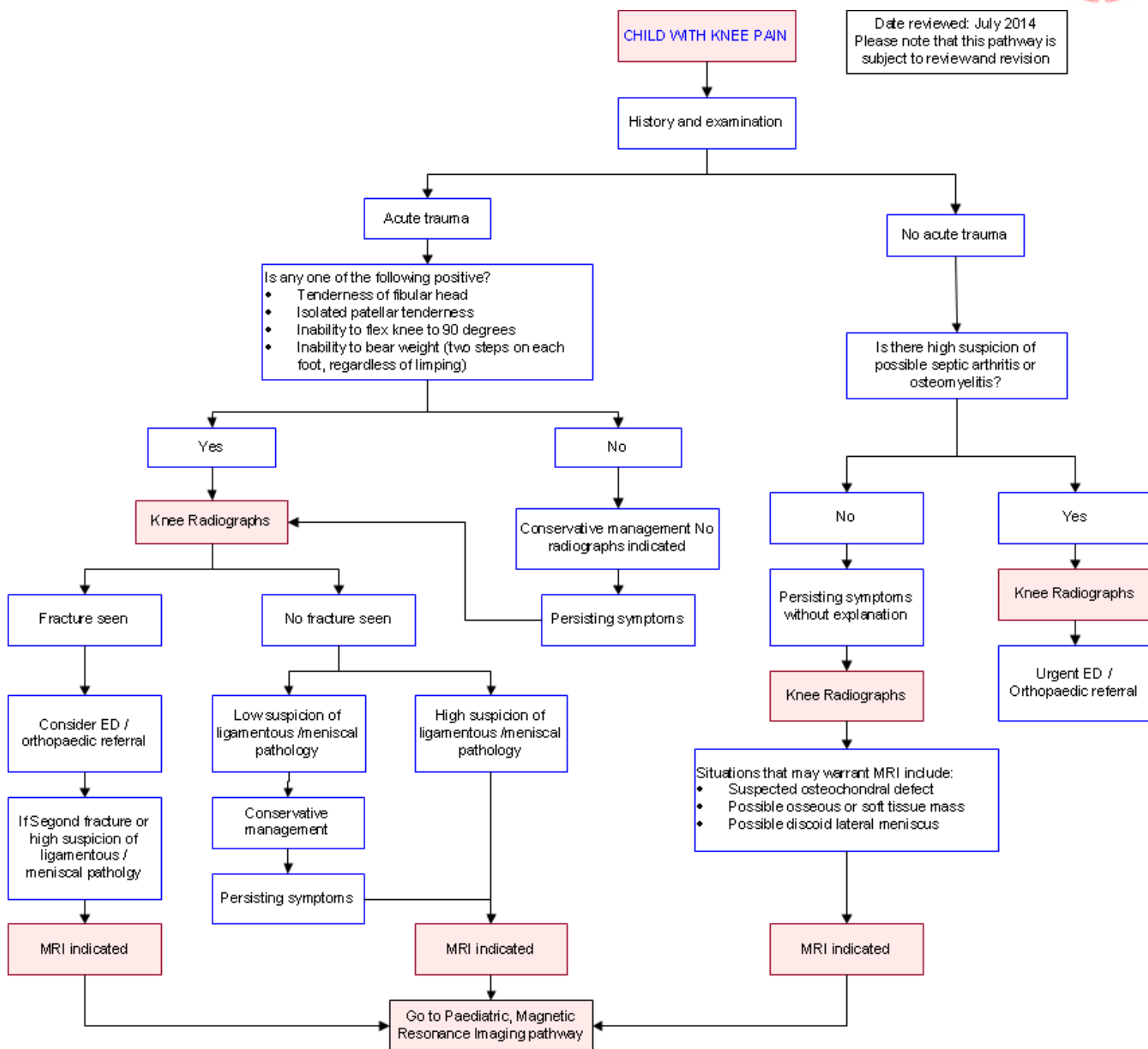


Image Gallery

Note: Images coming soon

Teaching Points

- Trauma to the paediatric knee is common
- Unrecognised fractures may result in permanent neurovascular deficit and growth disturbances

- Knee radiographs are one of the most common radiographs used to assess trauma in the ER. However it has the lowest yield for diagnosing clinically significant fractures
- MRI is becoming an important adjunct [1,2](#)

Knee Radiographs

- Plain radiography of the knee is the investigative mainstay for assessing knee injuries in children
- Interpretation is complicated by a number of issues
 - Relative radiolucency of the cartilaginous anatomy found in skeletally immature patients
 - Paediatric patients sustain different injuries compared to adults, particularly involving the physes
 - Low yield nature of knee radiographs for knee trauma, even in adults
- Clinical decision rules such as the Ottawa Knee Rule (OKR) can be used to reduce the rate of unnecessary radiographs performed. The OKR has been widely validated and investigated in adult populations, and shown to allow a relative reduction in use of radiography by around one third [3](#)
- Meta-analysis of their use in a paediatric population showed that the OKR had high sensitivity and adequate specificity for children over the age of 5. There was insufficient evidence for children under the age of 5 [4](#)
- Advantages
 - Fast, readily accessible
 - Will identify obvious fractures and joint effusions
- Disadvantages
 - Ionising radiation – albeit small exposure
 - Majority of patients with acute knee injuries have soft tissue injury

Magnetic Resonance Imaging (MRI)

- The knee is one of the most commonly imaged joints by MRI in the paediatric population
- Magnetic resonance imaging has several advantages over other modalities
 - No ionising radiation
 - Excellent soft tissue resolution, contrast & detail
 - MRI is able to evaluate injuries to the soft tissues, ligaments, menisci, epiphyses and bone contusions [5](#)
 - With improvements in MRI technology, accuracy of diagnosing paediatric meniscal and cruciate ligament tears is approaching that for adults. Studies suggest 92% sensitivity & 88% specificity for detecting ACL tears and 93-100% sensitivity and 87-95% specificity for meniscal injuries [6,7,8,9](#)
 - Capable of multiplanar reconstructions
 - MRI can affect management, although this has only been extensively investigated in adult patients so far
 - MRI has been shown to alter management in a proportion of adult patients with knee injuries [10](#)
 - Nikken et al performed two prospective studies on adult patients with acute knee injury without radiographic fracture. MRI imaging was found to shorten the time to diagnosis, reduce number of diagnostic procedures during followup, reduce medical costs & costs to society and improve quality of life in the first 6 weeks following injury [11,12](#)
- Disadvantages include cost, limited access & the need for patient sedation/general anaesthesia in



young children

References

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

1. Thapa MM, Chaturvedi A, Darling SE, Khanna PC, Ishak G, Chew FS. **MRI of paediatric patients: part 2, normal variants and abnormalities of the knee.** AJR Am J Roentgenol. 2012;198(5):W456-65. (Review article)
2. Pai DR, Strouse PJ. **MRI of the pediatric knee.** AJR Am J Roentgenol. 2011;196(5):1019-27. (Review article)
3. Jenny JY, Boeri C, El Amrani H, Dosch JC, Dupuis M, Moussaoui A, Mairot F. **Should plain X-rays be routinely performed after blunt knee trauma? A prospective analysis.** J Trauma. 2005;58(6):1179-82. (Level III evidence)
4. Vijayasankar D, Boyle AA, Atkinson P. **Can the Ottawa knee rule be applied to children? A systematic review and meta-analysis of observational studies.** Emerg Med J. 2009;26(4):250-3. (Level I evidence)
5. Jans LBO, Jaremko JL, Ditchfield M, Verstraete KL. **MR imaging findings of lesions involving cartilage and bone in the paediatric knee: a pictorial review.** JBR-BTR. 2011;94:247-53. (Review article).
6. Lee K, Siegel MJ, Lau DM, Hildebolt CF, Matava MJ. **Anterior cruciate ligament tears: MR imaging-based diagnosis in a pediatric population.** Radiology. 1999;213(3):697-704. (Level III evidence).
7. King SJ, Carty HM, Brady O. **Magnetic resonance imaging of knee injuries in children.** Pediatr Radiol. 1996;26(4):287-90. (Level II/III evidence)
8. Major NM, Beard LN Jr, Helms CA. **Accuracy of MR imaging of the knee in adolescents.** AJR Am J Roentgenol. 2003;180(1):17-9. (Level III evidence)
9. Yan R, Wang H, Yang Z, Ji ZH, Guo YM. **Predicted probability of meniscus tears: comparing history and physical examination with MRI.** Swiss Med Wkly. 2011;141:w13314. (Level III evidence).
10. Mori R, Ochi M, Sakai Y, Adachi N, Uchio Y. **Clinical significance of magnetic resonance imaging (MRI) for focal chondral lesions.** Magn Reson Imaging. 1999;17(8):1135-40. (Level III evidence)
11. Nikken JJ, Oei EH, Ginai AZ, Krestin GP, Verhaar JA, van Vugt AB, Hunink MG. **Acute peripheral joint injury: cost and effectiveness of low-field-strength MR imaging — results of randomized controlled trial.** Radiology. 2005;236(3):958-67. (Level II evidence)
12. Oei EH, Nikken JJ, Ginai AZ, Krestin GP, Verhaar JA, van Vugt AB, Hunink MG. **Costs and effectiveness of a brief MRI examination of patients with acute knee injury.** Eur Radiol. 2009;19(2):409-18. (Level II evidence)

Information for Consumers

Information from this website	Information from the Royal Australian and New Zealand College of Radiologists' website
-------------------------------	--

[Consent to Procedure or Treatment](#)

[Magnetic Resonance Imaging \(MRI\)](#)

[Radiation Risks of X-rays and Scans](#)

[Plain Radiography/X-rays](#)

[Magnetic Resonance Imaging \(MRI\)](#)

[Radiation Risk of Medical Imaging for
Adults and Children](#)

[Plain Radiography \(X-ray\)](#)

[Making Your Child's Test or Procedure
Less Stressful](#)

Copyright

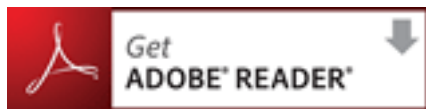
© Copyright 2015, Department of Health Western Australia. All Rights Reserved. This web site and its content has been prepared by The Department of Health, Western Australia. The information contained on this web site is protected by copyright.

Legal Notice

Please remember that this leaflet is intended as general information only. It is not definitive and The Department of Health, Western Australia can not accept any legal liability arising from its use. The information is kept as up to date and accurate as possible, but please be warned that it is always subject to change.

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](#)