

Diagnostic Imaging Pathways - Paediatric, Pneumonia (Recurrent or Persistent)

Population Covered By The Guidance

This pathway provides guidance on the imaging of paediatric patients with recurrent pneumonia.

Date reviewed: July 2017

Date of next review: July 2019

Published: September 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

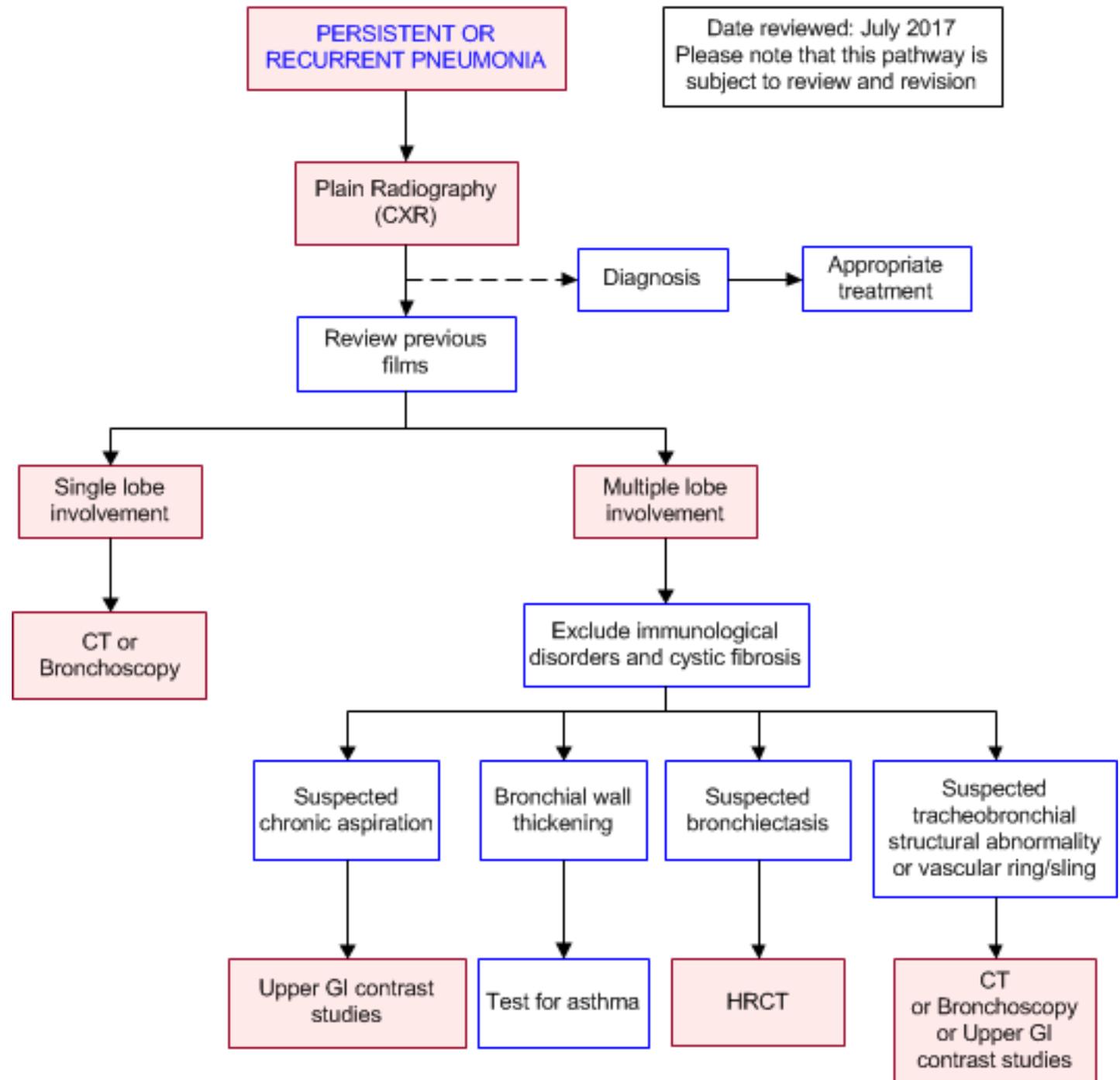


Image Gallery

Note: These images open in a new page

1a



Cystic Fibrosis with Bronchiectasis

Image 1a and 1b (Computed Tomography): Mild bilateral bronchiectasis predominantly involving the lower lobes. There are multiple areas of "tree-in-bud" bronchiolitis. No areas of ground glass opacification are identified.

1b



2a



Cystic Fibrosis with Bronchiectasis

Image 2a: Pneumonectomy showing grossly dilated bronchi with mucous plugging (blue arrows) and distal consolidation.

2b



Image 2b (H&E, x2.5): Section of a dilated bronchi with florid acute on chronic inflammation of the bronchial wall and surrounding interstitial

Teaching Points

- Recurrent pneumonia - two episodes within the same year, or 3 or more episodes over any time period. For a child to be diagnosed with recurrent pneumonia, there must be complete resolution of clinical and radiological findings between acute episodes
- Persistent or non-resolving pneumonia - when there is clinical and radiological evidence of pneumonia despite adequate treatment for a month
- Plain chest x-ray is indicated initially, with comparison to previous films essential
- Further investigations are dictated by the most likely diagnosis, based on the age of the child, the onset of symptoms and findings on clinical history and examination. CT of the chest or bronchoscopy may be indicated

Recurrent or Persistent Pneumonia in Children

- Pneumonia is clinically defined as a combination of respiratory symptoms (cough, dyspnoea, or tachypnoea) and signs (fever, crepitations, focally-reduced breath sounds, fremitus, or wheeze)
- Unfortunately, there are no guidelines, or universal agreement for the definitions of recurrent and persistent pneumonia [1](#)
- Suggested definitions include [2-4](#)
 - Recurrent pneumonia - two episodes within the same year, or three or more episodes over any time period. For a child to be diagnosed with recurrent pneumonia, there must be complete resolution of clinical and radiological findings between acute episodes
 - Persistent or non-resolving pneumonia - when there is clinical and radiological evidence of pneumonia despite adequate treatment for a month

Plain Radiography (CXR)

- Not all children with pneumonia receive chest radiographs, but a radiograph demonstrating pulmonary infiltrates is essential in defining an episode of pneumonia in cases of suspected persistent or recurrent pneumonia [3](#)
- Comparison should be made to previous films to confirm the diagnosis of pneumonia and assess if the consolidation is recurrent or longstanding [3](#)

- Unlike adults, there is no indication for routine follow-up of all otherwise healthy children with uncomplicated community acquired pneumonia. Those with clinical evidence or suspicion of recurrent or persistent pneumonia, or who are immunocompromised should have repeat films done at least 2-3 weeks after commencement of treatment [5, 6](#)
- Round pneumonia is common in children and simulates a pulmonary mass. In these cases, follow-up radiography is important to confirm resolution and to exclude the presence of an underlying mass [7](#)

Computed Tomography (CT) and High Resolution Computed Tomography (HRCT)

- The indications for CT in children with lower respiratory tract infections include [6, 8](#)
 - Suspected complications of bacterial pneumonia (e.g. abscess)
 - Exclude
 - Investigate the immunocompromised child with a normal or equivocal radiograph
- CT is the preferred method for investigating neck or mediastinal compressive masses affecting the airway [8](#)
- CT results in significant exposure to ionising radiation and care must be taken to minimise the effective dose [8](#)
- High Resolution Computed Tomography (HRCT) is used for evaluating all forms of bronchiectasis (including cystic fibrosis) and interstitial lung diseases in children [8, 9](#)
- HRCT should ideally be performed once acute infection has resolved in order to avoid issues with interpretation [2](#)

Contrast Upper Gastrointestinal Studies

- Indicated if aspiration, reflux, or mediastinal compressive masses/vascular rings compromising the airway are suspected [10, 11](#)

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. Vaughan D, Katkin JP. **Chronic and recurrent pneumonias in children.** Semin Respir Infect. 2002;17(1):72-84. (Review article). [View the reference](#)
2. Montella S, Corcione A, Santamaria F. **Recurrent Pneumonia in Children: A Reasoned Diagnostic Approach and a Single Centre Experience.** Int J Mol Sci. 2017;18(2):296. (Review article). [View the reference](#)
3. Wald ER. **Recurrent and nonresolving pneumonia in children.** Semin Respir Infect. 1993;8(1):46-58. (Review article). [View the reference](#)
4. Yousif TI, Elnazir B. **Approach to a child with recurrent pneumonia.** Sudanese Journal of Paediatrics. 2015;15(2):71-7. (Review article). [View the reference](#)
5. Gaston B. **Pneumonia.** Pediatr Rev. 2002;23(4):132-40. (Review article). [View the reference](#)
6. Donnelly LF, Klosterman LA. **The yield of CT of children who have complicated pneumonia and noncontributory chest radiography** AJR Am J Roentgenol. 1998;170(6):1627-31. (Level III evidence). [View the reference](#)



7. Liu YL, Wu PS, Tsai LP, Tsai WH. **Pediatric round pneumonia.** *Pediatr Neonatol.* 2014;55(6):491-4. (Level IV evidence). [View the reference](#)
8. Copley SJ. **Application of computed tomography in childhood respiratory infections.** *Br Med Bull.* 2002;61:263-79. (Review article). [View the reference](#)
9. Bayramoglu S, Cimilli T, Aksoy S, Yildiz S, Salihoglu B, Hatipoglu S, et al. **The role of HRCT versus CXR in children with recurrent pulmonary infections.** *Clin Imaging.* 2005;29(5):317-24. (Level III evidence). [View the reference](#)
10. Rosbe KW, Kenna MA, Auerbach AD. **Extraesophageal reflux in pediatric patients with upper respiratory symptoms.** *Arch Otolaryngol Head Neck Surg.* 2003;129(11):1213-20. (Level III evidence). [View the reference](#)
11. Yellon RF, Goldberg H. **Update on gastroesophageal reflux disease in pediatric airway disorders.** *Am J Med.* 2001;111 Suppl 8A:78-84. (Review article). [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 Computed Tomography (CT) Chest Radiograph (X-ray)	Computed Tomography (CT) Plain Radiography/X-rays Radiation Risk of Medical Imaging for Adults and Children Making Your Child's Test or Procedure Less Stressful

Copyright

© Copyright 2017, 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.

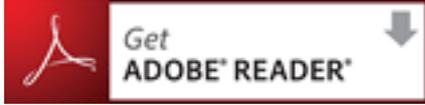
Legal Notice

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](#)