

Diagnostic Imaging Pathways - Respiratory Illness (Acute)

Population Covered By The Guidance

This pathway provides guidance on imaging patients with acute respiratory illness and provides guidelines as to who would benefit from plain chest radiography.

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Date of next review: 2017/2018

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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

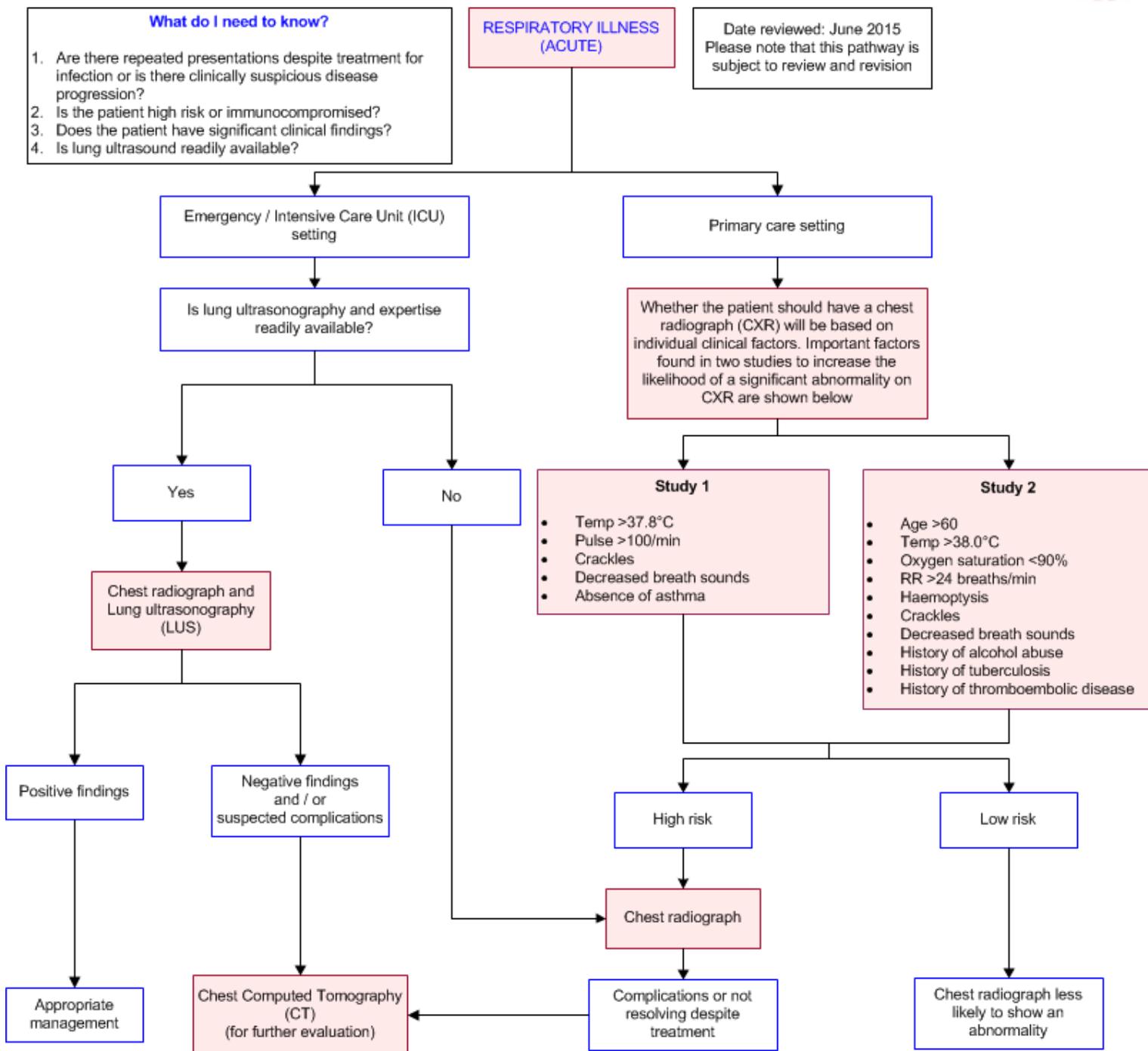


Image Gallery

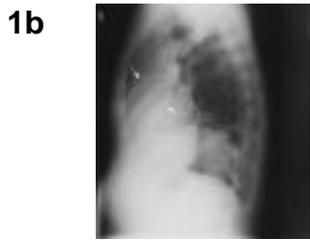
Note: These images open in a new page

1a



Pneumococcal Pneumonia

Images 1a and 1b (Plain Radiograph, PA and Lateral): There is widespread consolidation of the right lung with air bronchograms and bulging of the fissures (arrows) indicative of lobar pneumonia.



Pneumocystis Pneumonia

Image 2 (Plain Radiograph): Patchy bilateral infiltrates extending from the perihilar region is suggestive of *Pneumocystis jirovecii* (formerly *Pneumocystis carinii*) infection in this immunocompromised patient.



Tuberculous Pneumonia

Image 3 (Plain Radiograph): There is right middle and upper lobe consolidation with bilateral paratracheal lymphadenopathy (arrows). Multiple small nodules are scattered throughout the remaining lung parenchyma (arrowheads) indicative of tuberculous pneumonia with miliary spread.



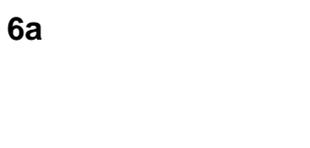
Lung Abscess

Images 4a and 4b (Plain Radiograph, PA and Lateral): A large circumscibed lesion is present in the right lower lobe with a well defined wall and an air-fluid level consistent with a lung abscess.



Bronchopneumonia

Images 5a and 5b : Post-mortem specimen showing patchy areas of consolidation consistent with bronchopneumonia.



Collapse Lung

Images 6a, 6b and 6c (Plain Radiograph): There is collapse of the right upper lobe, the left upper lobe(the Golden S sign) and the left lower lobe



respectively.

6b



6c



Teaching Points

Role of Imaging in Acute Respiratory Illness

- Chest radiography is over utilized in the management of acute respiratory illness
- Certain clinical symptoms and signs can suggest a diagnosis of pneumonia but none can definitely rule in or out the diagnosis
- 5% of patients with acute respiratory illness have pneumonia from a primary care setting. This increases to 28% of patients in the accident and emergency environment
- CT is not routine in the setting of acute respiratory illness
- Lung ultrasonography (LUS) has shown to be promising in the evaluation of pneumothorax, pleural effusion and consolidations but with varying outcomes for the diagnosis of pneumonia. Therefore, an inconspicuous LUS does not exclude pneumonia and necessitates a chest radiography or chest CT scan for further evaluation

Factors That Increase The Likelihood Of A Significant Abnormality On Chest Radiograph

- The factors listed below come from two studies that attempted to develop clinical decision rules for predicting chest radiograph abnormalities
- Study 1 [1](#)
 - Temp >37.8°C
 - Pulse >100/min
 - Crackles
 - Decreased breath sounds
 - Absence of asthma
- Study 2 [2](#)
 - Age >60
 - Temp >38°C
 - Oxygen saturation



- Respiratory rate >24 breaths/min
 - Haemoptysis
 - Crackles
 - Decreased breath sounds
 - History of alcohol abuse
 - History of tuberculosis
 - History of thromboembolic disease
- Patients who are immunocompromised should be investigated initially with a chest radiograph if there is clinical suspicion of an acute respiratory illness. However the sensitivity of chest radiograph is too low to consider it a stand-alone technique for the evaluation of immunocompromised patients whose immune reactivity is poorer and delayed compared with immuno-competent ones, with suspected pneumonia. For these patients, an early chest CT evaluation is therefore recommended [3](#)
 - Fever and tachypnoea in children are strong indicators that a chest radiograph is needed. No single sign or symptom predicts pneumonia with a high degree of certainty in adult and geriatrics patients. Clinical utility of chest radiograph can be improved with careful clinical examination of patients before obtaining radiographs, especially in paediatric patients [4](#)
 - A number of other studies have attempted to identify which patients should have a chest radiograph but none concur on significant factors [5-9](#)
 - The absence of radiographic findings should not supersede clinical judgment and empiric treatments in patients with clinical suspicion of pneumonia [10-12](#)

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Chest Radiograph

- Patients with acute respiratory illness but without pneumonia often have unnecessary chest radiographs and these result in unnecessary cost and radiation exposure [1](#)
- Many patients with acute respiratory illness receive a chest radiograph, usually to diagnose or exclude pneumonia [13](#)
- Approximately 5% of patients who present to their primary care physician with an acute respiratory illness will have pneumonia [14](#) as chest radiography was not very useful for diagnosing pneumonia in patients with a low clinical probability of pneumonia [15](#)
- Of patients with an acute respiratory illness who present to an Emergency Department, as many as 28% will have pneumonia [5](#)
- Admission radiographs lacks sensitivity and may not demonstrate parenchymal opacifications in 21% of patients. Moreover, greater than half of patients admitted with a negative chest radiograph will develop radiographic infiltrates within 48 hours. [16,17](#) Because of the low sensitivity and inter-observer variability, some of the infiltrates can be missed [17](#)
- Routine short-term follow-up chest radiographs (

Lung Ultrasonography (LUS)

- In comparison with chest radiography, especially in the emergency and critical care setting,

lung ultrasonography (LUS) has shown to be promising with excellent sensitivity 93-94%, specificity 95-96% and diagnostic accuracy 94% in the evaluation of pneumothorax, pleural effusion and consolidations [22,26](#)

- LUS have varying outcomes for the diagnosis of pneumonia [22-25,27](#)
- Despite this, a recent systematic review and meta-analysis revealed encouraging results to support the use of lung ultrasonography for the diagnosis of pneumonia [28](#)
- About 8% of pneumonic lesions are not detectable by LUS; therefore, an inconspicuous LUS does not exclude pneumonia. Chest radiography or chest CT scan is necessary in cases with negative ultrasound results or if other differential diagnoses are considered or if complications occur [27](#)
- Advantages of LUS [28,29](#)
 - No ionising radiation; hence is preferred in pregnant or presumed pregnant patients and children
 - Can be utilized as point-of-care imaging in severely ill, frail and bedridden patients at the bedside
 - The evaluation is easy and fast to perform
- Due to its high negative predictive value (NPV), LUS's value as a standard rule-out (SnNout) examination in patients with respiratory symptoms should be considered [26,30](#)

References

Date of literature search: June 2015

The search methodology is available on request. [Email](#)

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

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