



# Thoracic Imaging in COVID-19 Infection

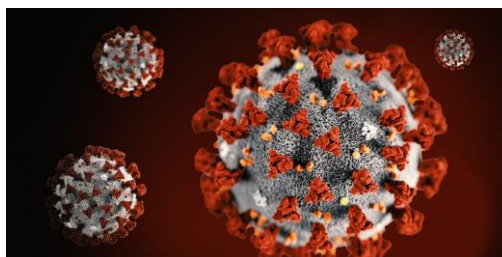
Guidance for the Reporting Radiologist  
British Society of Thoracic Imaging

1



## Background COVID-19

- First cases Wuhan City China  
December 2019
- Large outbreak Northern Italy  
February 2020
- First UK cases seen February  
2020
- WHO Pandemic March 2020

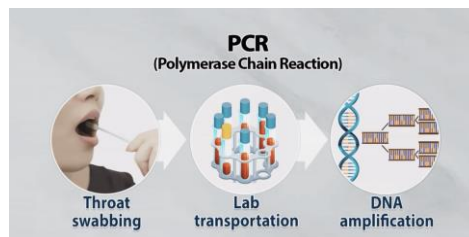


2

# PCR



- Throat swab
- Concern re availability of testing kit. When the demand increases processing times may also significantly increase
- China - ran out of PCR testing kits so implemented CT scanning as a diagnostic tool
- PCR sensitivity 60-70% and can give a false negative result initially
- Retesting patients - precipitates further delays in turnaround of PCR results



3

# Departmental Protocols



**Standard operating procedures should be developed locally based around:**

- Minimising risk to staff
- Infection control
- Portable CXR
- Standard departmental CXR
- Transferring patient to and from the Radiology department
- CT scanning & deep cleaning



4

# Imaging Requests



## Sufficient Information needs documenting on all Imaging referrals:

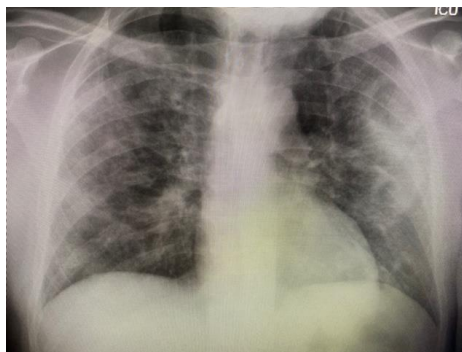
- Departments should work with local clinicians to ensure relevant clinical information is documented on radiology request for chest imaging:
- Suspicion of COVID-19
- Infection risk - impacts on how, where and when patients are imaged
- Raised WCC / lymphopaenia - usually present in COVID-19
- CRP - unusual to be COVID-19 +ve if CRP is normal
- Relevant respiratory history
- Smoking history

5

# Imaging

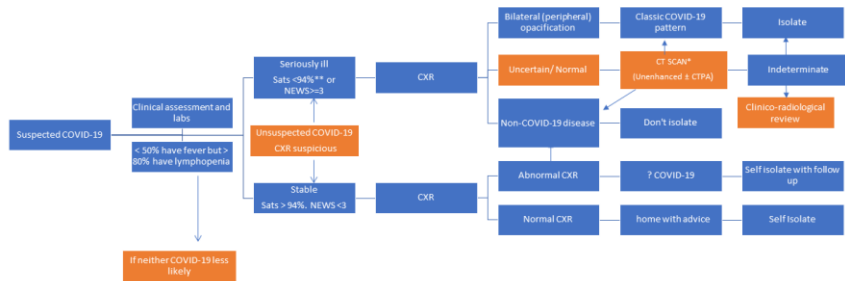


- At time of writing there is timely access to PCR testing and rapid turnaround of results. Therefore there is no role for CT imaging in the **diagnosis** of COVID-19 unless the patient is **seriously ill**
- Imaging (CXR & CT) is likely to be used in the following situations: Guide clinicians in individual patient **management decisions**, dealing with **complications** or looking for an **alternative diagnosis**



6

## Radiology decision tool for suspected COVID-19



\* Classic and Indeterminate CTs should be scored either: 'mild' or 'moderate/severe'

\*\*94% unless known COPD in which case > 90%

\*\*\*Please upload all COVID 19 cases to BSTI database: <https://www.bsti.org.uk/training-and-education/covid-19-bsti-imaging-database/>

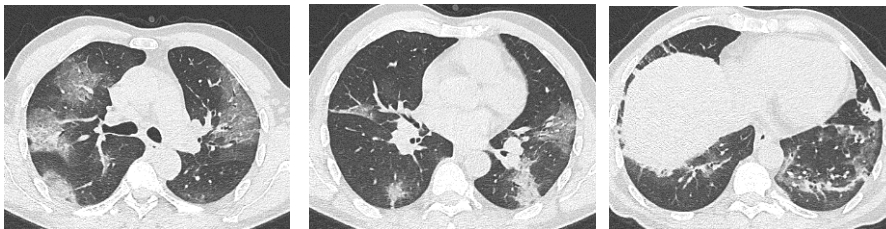


7

## Possible COVID-19 Infection



- Peripheral ground-glass opacities
- Crazy paving may be present
- Diffuse alveolar damage
- Organising pneumonia

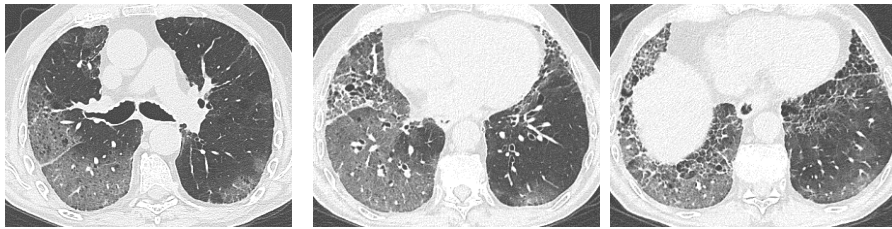


8

# Indeterminate for COVID-19



- Ground-glass / patchy / non peripheral changes
- Effusions
- Fibrosis with ground glass
- Lymph node enlargement
- Complex patterns



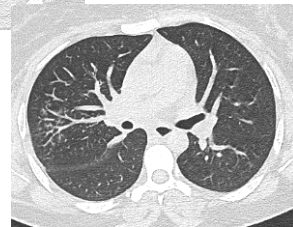
9

# Alternative diagnosis



**The following would be unusual in COVID -19 infection:**

- Lobar pneumonia
- Cavitating infections
- Tree-in bud changes



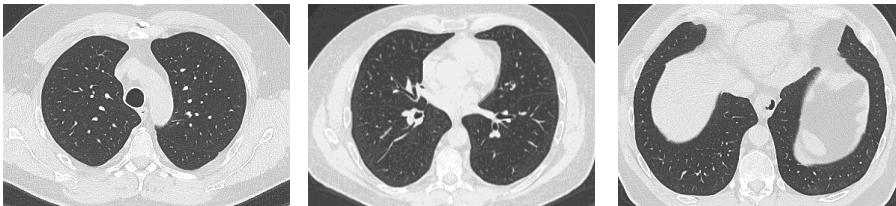
**Differentiating abnormalities in the presence of underlying emphysema or interstitial lung disease maybe difficult**

10

# Normal



- It is important to remember that a normal CT can be seen in early COVID-19 infection



11

## CT pattern and quantifying disease

Radiology	Parenchymal lung changes	Severity
Indeterminate (DD covid v other disorders)	Up to 3 focal abnormalities 3cm in max diameter	Mild
	More than 3 focal abnormalities or max diameter >3cm	Moderate / Severe*

\* The difference between moderate and severe is subjective and will likely differ between reporters. This should be used in conjunction with clinical assessment.

12

## CT pattern and quantifying disease (2)

Radiology in probable COVID-19	Severity
Pure ground glass opacities	Up to 3 focal abnormalities < 3cm in max diameter Mild
Pure ground glass opacities	More than 3 focal abnormalities or max diameter >3cm Moderate / Severe*
Focal ground glass opacities mixed with early consolidation	Moderate / Severe*
Diffuse ground glass opacities or consolidation with signs of architectural distortion	Severe

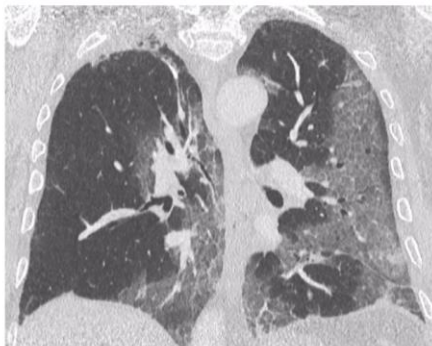
\* The difference between moderate and severe is subjective and will likely differ between reporters. This should be used in conjunction with clinical assessment.

13

## What to report on CT



- Clinical details
- Describe features
- Distribution of changes: Lobes / anatomy/ peripheral v central v mixed - use axial and coronal images.
- Number of opacities and extent maybe helpful in categorising into mild moderate or severe involvement (See previous slides)
- Background lung conditions eg Emphysema (mild / moderate / severe), UIP
- Conclusion: Highly suspicious for viral pneumonia / possible viral pneumonia / other diagnosis is likely / normal. A comment regarding mild moderate or severe based on information in the previous slide may be useful for the clinical teams managing these patients.



14

# Scenarios to consider



- Incidental or unexpected finding on CXR. Clear advice needs to be given to radiographers regarding who to contact and what to do next in such a situation
- Dealing with unexpected findings on CT e.g. abnormal lung bases on CT abdomen & pelvis
- Clinical teams are likely to require additional support from radiology, particularly on ITU & respiratory units
- Workforce planning: Departmental cover and on call provisions in the case of staff absence

15

# Case Database



- Refer a case: [https://bit.ly/BSTICovid19\\_Database](https://bit.ly/BSTICovid19_Database)
- Teaching Library: [https://bit.ly/BSTICOVID19\\_Teaching\\_Library](https://bit.ly/BSTICOVID19_Teaching_Library)
- We will endeavor to keep you updated from a radiology perspective as the situation changes.
- Updates can be found on [www.bsti.org.uk](http://www.bsti.org.uk) or via our facebook or twitter feeds.

The BSTI would like to thank Prof Nicola Sverzellati and his team in Parma Italy for sharing information and images.

16