
 <p><b>PHILIPPINE HEART CENTER INCIDENT COMMAND POST</b></p>	Document Type	Document Code: GL-ICP-022
	<b>GUIDELINES</b>	Effective Date: May 2020
	Document Title	Revision Number: 0
	<b>GUIDELINES FOR THE APPROPRIATENESS OF REQUEST FOR RADIOLOGIC EXAMINATION OF PATIENTS SUSPECTED OR CONFIRMED WITH COVID-19</b>	Page: 2 of 7

## I. Guidelines:

1. Chest X-ray (CXR)
  - 1.1. Ruling in COVID-19 infection/pneumonia in symptomatic or asymptomatic patients at risk
    - 1.1.1. Chest X-ray is NOT routinely indicated as a screening test for COVID-19 in asymptomatic individuals.
    - 1.1.2. Chest X-ray is NOT advised for patients with mild symptoms who are COVID-19 positive without accompanying risk factors for disease progression, or for patients with mild symptoms who are COVID-19 negative.
    - 1.1.3. Chest X-ray is INDICATED for patients with moderate to severe symptoms of COVID-19 regardless of COVID-19 test results.
    - 1.1.4. In a resource constrained situation where access to CT is limited, CXR may be preferred for patients with COVID-19 unless features of respiratory worsening warrant the use of CT.
    - 1.1.5. Chest X-ray is INDICATED for patients with COVID-19 and evidence of worsening respiratory status.
    - 1.1.6. Chest X-ray is NOT SENSITIVE in mild or early COVID-19 infection.
    - 1.1.7. Chest X-ray will have a higher sensitivity in communities that are encouraged to stay at home until they experience advanced symptoms.
    - 1.1.8. Imaging is ADVISED for patients with mild features risk factors for COVID-19 progression and either positive COVID-19 testing or moderate-to-high pre-test probability in the absence of COVID-19 testing
  - 1.2. Patient monitoring in COVID 19 patients.
    - 1.2.1. Daily chest radiographs are NOT indicated in stable intubated patients with COVID-19. Multiple studies have shown no difference in important outcomes (mortality, length of stay, and ventilator days) for intensive care unit patients imaged on-demand as compared to a daily routine protocol.
    - 1.2.2. In the presence of clinical worsening, imaging is again ADVISED to assess for COVID-19 progression or secondary cardiopulmonary abnormalities such as pulmonary embolism, superimposed bacterial pneumonia, or heart failure that can potentially be secondary to COVID-19 myocardial injury.
    - 1.2.3. Equipment portability with imaging performed within an infected patient's isolation room is another factor that may favor CXR in selected populations, effectively eliminating the risk of COVID-19 transmission along the transport route to a CT scanner and within the room housing a CT scanner, particularly in environments lacking PPE.
    - 1.2.4. In hospitalized patients CXR can be USEFUL for assessing disease progression and alternative diagnoses such as lobar pneumonia, suggestive of bacterial superinfection, pneumothorax and pleural effusion.

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## 2. Chest CT Scan

### 2.1. Ruling in COVID-19 infection/pneumonia in symptomatic or asymptomatic patients at risk


- 2.1.1. Chest CT scan is NOT routinely indicated as a screening test for COVID-19 in asymptomatic individuals
- 2.1.2. Chest CT scan is NOT advised for patients with mild symptoms who are COVID-19 positive without accompanying risk factors for disease progression, or for patients with mild features who are COVID-19 negative.
- 2.1.3. Chest CT scan is INDICATED for patients with moderate to severe features of COVID-19 regardless of COVID-19 test results.
- 2.1.4. In a resource constrained situation where access to CT is limited, CXR may be preferred for patients with COVID-19 unless features of respiratory worsening warrant the use of CT
- 2.1.5. Chest CT scan is ADVISED to support more rapid triage of patients in a resource-constrained setting when point of care COVID-19 testing is not available or negative.
- 2.1.6. Chest CT scan is MORE SENSITIVE than chest radiographs in early lung parenchymal disease.
- 2.1.7. Reduction in CT scanner availability due to the additional time required to clean and disinfect equipment following imaging of patients with suspected COVID-19.
- 2.1.8. Ruling out COVID-19 infection/pneumonia in symptomatic or asymptomatic patients at risk In a meta-analysis comparing the performance of chest CT and RT-PCR, negative predictive value (NPV) of chest CT ranged from 95.4% to 99.8%, hence chest CT scans can possibly be used for ruling out COVID-19 infection. However, imaging is NOT routinely indicated as a screening test for COVID-19 in asymptomatic individuals
- 2.1.9. In highly prevalent areas, an additional uncertainty is whether CT should be used as a screening tool either as a stand-alone or as an adjunct to RT-PCR to exclude occult infection prior to surgery or intensive immunosuppressive therapies.

### 2.2. Accurately diagnosing COVID-19 infection (pneumonia) in symptomatic or asymptomatic patients at risk

- 2.2.1. In a meta-analysis comparing the performance of chest CT and RT-PCR, positive predictive value (PPV) of chest CT ranged from 1.5% to 30.7%, hence chest CT scans are NOT recommended for accurately diagnosing COVID-19 infection.

### 2.3. Patient monitoring in COVID 19 patients.

- 2.3.1. In the presence of clinical worsening, imaging is again ADVISED to assess for COVID-19 progression or secondary cardiopulmonary abnormalities such as pulmonary embolism, superimposed bacterial pneumonia, or heart failure that can potentially be secondary to COVID-19 myocardial injury
- 2.3.2. Chest CT scan is INDICATED in patients with functional impairment and/or hypoxemia after recovery from COVID-19.
- 2.3.3. Chest CT scan is more SENSITIVE for disease progression, and alternative diagnoses including acute heart failure from COVID-19 myocardial injury and when acquired with intravenous contrast material, pulmonary thromboembolism
- 2.3.4. COVID-19 testing is INDICATED in patients incidentally found to have findings suggestive of COVID-19 on a CT scan.


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### 3. Chest Ultrasound

- 3.1. Ruling in COVID-19 infection/pneumonia in symptomatic or asymptomatic patients at risk.
  - 3.1.1. The sensitivity of lung ultrasound compared to the chest CT scan in detecting COVID-19 pneumonia for different degrees of pulmonary involvement is YET TO BE ESTABLISHED.
  - 3.1.2. Ruling out COVID-19 infection/pneumonia in symptomatic or asymptomatic patients The negative predictive value (NPP) of lung ultrasound in the setting of COVID-19 endemic disease or under normal conditions is YET TO BE ESTABLISHED.
- 3.2. Accurately diagnosing COVID-19 infection (pneumonia) in symptomatic or asymptomatic patients at risk.
- 3.3. The positive predictive value of lung ultrasound in the setting of COVID-19 pandemic or under normal conditions is yet TO BE ESTABLISHED.
- 3.4. Patient monitoring or evaluation of the effect intervention (e.g. prone positioning, mechanical ventilation, etc.) in COVID 19 patients.
  - 3.4.1. While the utility of ultrasound in detecting the progression (or regression) of the severity of lung involvement over the days (capacity to distinguish mild, moderate and severe involvement) is yet TO BE ESTABLISHED, the Ultrasound Department shall use the presence or absence of the following sonographic patterns:
    - A lines, B-lines, pleural thickening and irregularity or subpleural condensations, consolidation and presence or absence of pleural effusion.
- 3.5. Screening for patients who could be candidates for a particular intervention (e.g. non-invasive ventilation or from lying in prone position)
  - 3.5.1. Utility of ultrasound in the screening for patients who could possibly benefit from a particular therapy (e.g. non-invasive ventilation or from lying in prone position) is yet TO BE ESTABLISHED.
- 3.6. Image-guided thoracentesis or paracentesis
  - 3.6.1. Ultrasound is very useful to guide pleural punctures for safer fluid drainage and for the assessment of the changes in the amount of pleural fluid, which is an ESTABLISHED practice, although pleural effusions are not a typical feature of COVID-19.

### 4. Definition

- 4.1. Severity of respiratory disease
  - 4.1.1. Mild: No evidence of significant pulmonary dysfunction or damage (e.g., absence of hypoxemia, no or mild dyspnea)
  - 4.1.2. Moderate-to-severe: Evidence of significant pulmonary dysfunction or damage (e.g. hypoxemia, moderate-to-severe dyspnea)
- 4.2. Pre-test probability - Based upon background prevalence of disease as estimated by observed transmission patterns. May be further modified by individual's exposure risk. Sub-categorized as:
  - 4.2.1. Low: Sporadic transmission
  - 4.2.2. Medium: Clustered transmission
- 4.3. Risk factors for disease progression
  - 4.3.1. Present: Clinical judgement regarding combination of age > 65 years and presence of comorbidities (e.g., cardiovascular disease, diabetes, chronic respiratory disease, hypertension, immune-compromised)
  - 4.3.2. Absent: Defined by the absence of risk factors for disease progression

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#### 4.4. Disease progression

4.4.1. Progression of mild disease to moderate-to-severe disease as defined above.

4.4.2. Progression of moderate-to-severe disease with worsening objective measures of hypoxemia.

#### 4.5. Resource constraints

4.6. Limited access to personnel, personal protective equipment, COVID-19 testing ability (including swabs, reagent, or personnel), hospital beds, and/or ventilators with the need to rapidly triage patients.

This shall serve as guide to standardize the results of Chest Radiographs and CT scans in regards to COVID-19 so that they are more clinically actionable either for establishing a diagnosis or for guiding management, triage, or therapy.

As this COVID-19 situation is evolving and unpredictable, these policies are subject to revision as required.


#### References:

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#### Appendix:

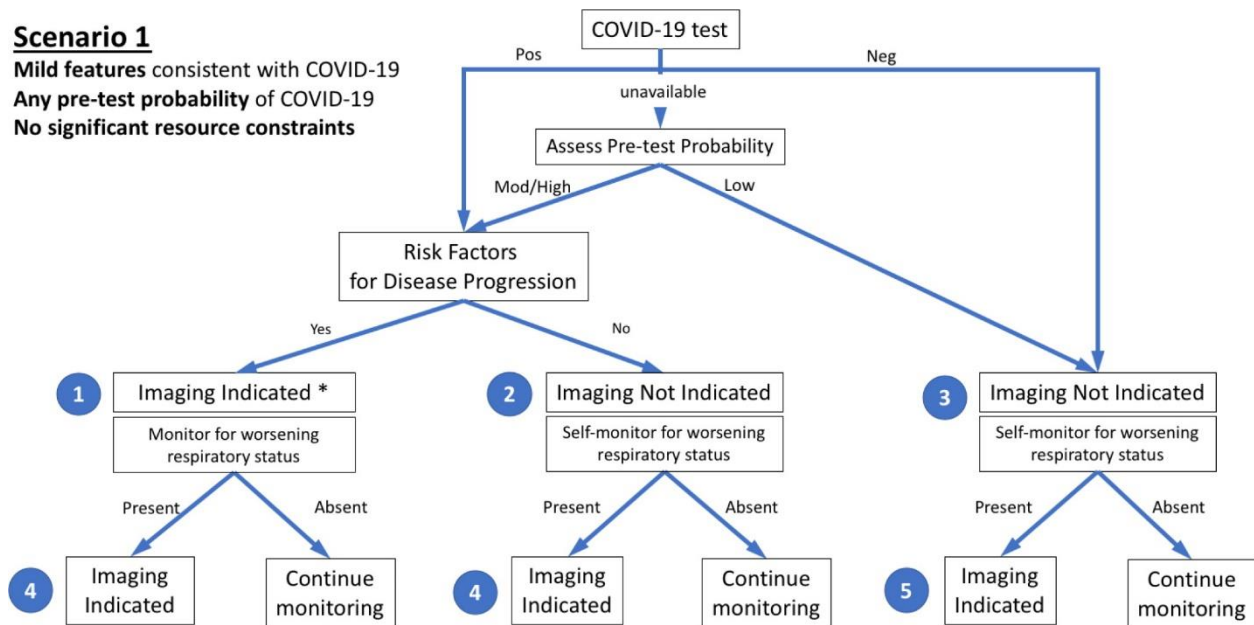
Algorithms adapted from the Multinational consensus statement from the Fleischner Society: The role of chest imaging in patient management during the COVID-19 pandemic (April 7, 2020).

The Consensus Statement is based upon expert opinion amongst a panel of 15 thoracic radiologists, 10 pulmonologists/intensivists (including one anesthesiologist), and 1 pathologist, as well as additional experts in emergency medicine, infection control, and laboratory medicine. The panel included individuals from the United States, Italy, China, Germany, France, United Kingdom, Netherlands, South Korea, Canada, and Japan, representing 9 of the 15 countries with the highest number of confirmed COVID-19 cases reported worldwide as of April 1, 2020.

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**Scenario 1**

Mild features consistent with COVID-19  
Any pre-test probability of COVID-19  
No significant resource constraints



\* Clinical judgement should dictate the use of imaging through consideration of patient risk factors and local resources.

Figure 1. First of three clinical scenarios. Mild features refer to absence of significant pulmonary dysfunction or damage.

**Scenario 2**

Moderate to severe features consistent with COVID-19  
Any pre-test probability of COVID-19  
No significant resource constraints

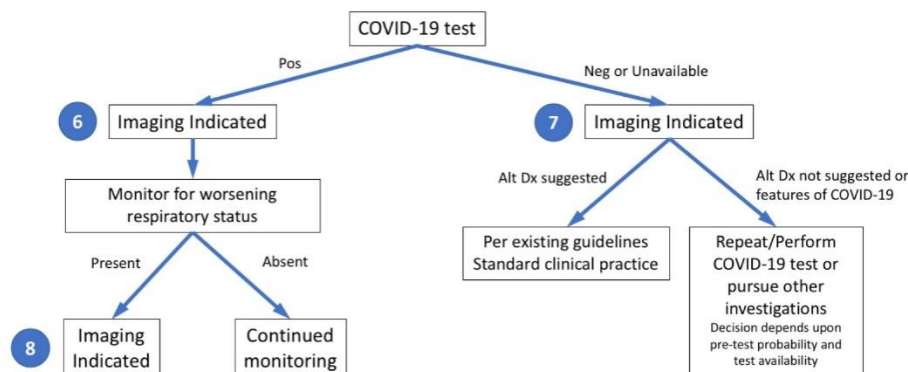



Figure 2. The second of three clinical scenarios. Moderate-to-severe features refer to evidence of significant pulmonary dysfunction or damage.

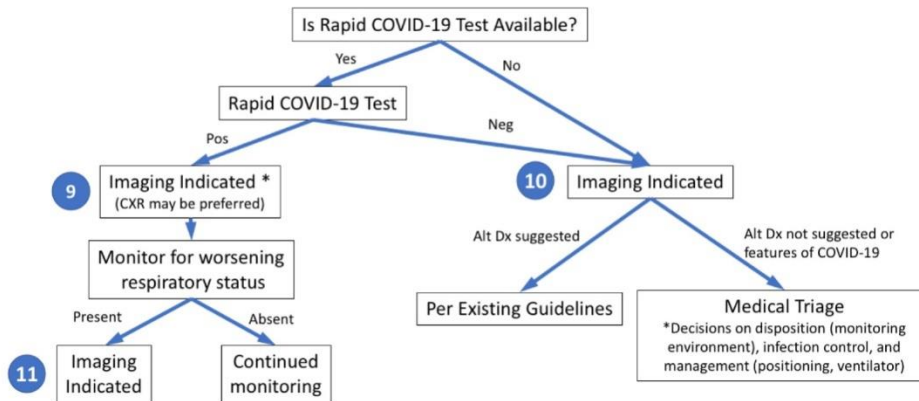
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**Scenario 3**

Moderate to severe features consistent with COVID-19

High pre-test probability of COVID-19

Resource constrained (Need for urgent patient triage due to lack of resources – beds, ventilators, medical personnel, PPE, COVID tests)



\* Lower priority if severely resource constrained, relative to 10 or 11.

Figure 3. The third of three clinical scenarios. Moderate-to-severe features refer to evidence of significant pulmonary dysfunction or damage