Emergency Department COVID-19 Management Tool

April 2021

This tool was developed to provide a pragmatic framework to assist with severity classification, risk assessment, diagnostic workup, disposition, and treatment of patients with suspected or confirmed SARS-CoV-2 (COVID-19) in the emergency department.

- It is designed to assist with the management of adult patients (≥18 years old) with symptomatic infection.
- It is not a substitute for clinicians’ own assessment and clinical judgement of what is best for the patient.
- This tool is not exhaustive in regards to diagnostic and treatment recommendations. Patients may present with particular conditions (MI, PE, stroke) that could be manifestations of severe or critical COVID-19. These conditions may require additional specific diagnostic and therapeutic interventions not discussed in this tool.
- Evidence on this topic is evolving quickly and may change recommendations.

Step 1 - Severity Classification
Assess the patient’s severity of disease utilizing NIH criteria.

<table>
<thead>
<tr>
<th>Variable</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory rate (per minute)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Oxygen saturation (%)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Heart rate (per minute)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Alertness</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Inspired oxygen</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Sex</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Performance status</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
</tbody>
</table>

Step 2 - Risk Prognostication
Patients with MILD and MODERATE Severity should be further assessed to determine their risk of disease progression.

The PRIEST Score is a validated tool to predict a patient’s risk for end organ failure and/or mortality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
<th>4 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory rate (per minute)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
<td>Oxygen saturation (%)</td>
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<td>arry.png)</td>
<td>![image](show/do_not_have</td>
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<td>Temperature (°C)</td>
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<td>arry.png)</td>
<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
<tr>
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<td>![image](show/do_not_have</td>
<td>arry.png)</td>
</tr>
</tbody>
</table>

Step 3 - Risk Assessment
Assess the patient for additional risk factors that have been correlated with higher risk for severe disease, organ failure, and/or mortality.

If your patient has one (or especially multiple) risk factors, you may want to consider in the approach taken in subsequent steps for diagnostic testing, disposition, and treatment.

Risk factors include, but are not limited to:
- Cancer: especially those with diagnosis <1 year, actively in treatment, and/or hematologic malignancies
- Cardiovascular Disease
- Chronic Respiratory Disease (including COPD)
- Diabetes Type II
- Down’s Syndrome
- Hypertension
- Immunosuppression (including organ transplant and asplenia)
- Neurologic disease (including dementia and previous strokes)
- Obesity (BMI ≥35)
- Obstructive Sleep Apnea
- Pregnancy
- Renal Disease (GFR <30)
- Steroid usage (recent)
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Step 4 - Diagnostic Testing

The following imaging and lab tests should be considered based on your patient’s severity and risk for disease progression.

### Step 5 - Diagnostic Interpretation

The following lab results (if obtained) have been shown to potentially be indicators of risk of disease progression, more severe disease, and/or mortality.

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>AST</td>
<td>Creatinine</td>
<td>CRP</td>
</tr>
<tr>
<td>&lt;40 U/L</td>
<td>&lt;40 U/L</td>
<td>&gt;1.5 mg/dL</td>
<td>&gt;125 mg/L</td>
</tr>
<tr>
<td>D-dimer</td>
<td>Ferritin</td>
<td>LDH</td>
<td>Lymphopenia</td>
</tr>
<tr>
<td>&lt;1 mg/dL</td>
<td>&gt;300 μg/L</td>
<td>&gt;250 U/L</td>
<td>&lt;0.8 x10^9/L</td>
</tr>
<tr>
<td>Ferritin</td>
<td>Neutrophils</td>
<td>Troponin</td>
<td>WBC</td>
</tr>
<tr>
<td>&gt;3 mg/L</td>
<td>&gt;8,000/mm^3</td>
<td>&gt;99%</td>
<td>&gt;10,000/ mm^3</td>
</tr>
</tbody>
</table>

Unfortunately, cutoffs used for abnormal lab values are heterogeneous across studies and may need to be adjusted based on reference ranges at your facility.

### Step 6 - Disposition

The following represents a pragmatic approach for disposition of patients depending on their disease severity. Clinician’s may want to consider a patient’s risk for progression of disease based on PRIEST Score, risk factors, imaging, and labs in their disposition decision.

**MILD**
- Discharge Home
- Supply patient with educational materials on precautions and items to be monitoring at home (CDC Patient Educational Materials)

**MODERATE**
- Discharge Home, consider if ALL:
  - PRIEST Score ≤4
  - 1 (or less) Risk Factors
  - No concerning Imaging or Lab results
  - Capability and resources to care for self at home
  - No other condition that warrants admission
- Admission Location:
  - Based on clinician’s judgement
  - Observation
  - Inpatient Floor
  - Intermediate

**SEVERE**
- Admission Location:
  - Based on clinician’s judgement
  - Floor Bed
  - Intermediate
  - ICU
- Transfer
  - Consider transfer if your facility does not have the resources or capacity to care for a critically ill COVID patient.

**CRITICAL**
- Admission
- ICU
- Transfer
  - Consider transfer to an ECMO facility for patients who may benefit from this treatment.
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Step 7a - Non-Pharmacologic Treatment
The following treatments should be considered based on your patient’s severity and risk of disease progression.

- Adequate hydration
- Balanced diet
- Adequate rest/sleep
- Resting in the prone position if dyspneic
- Consider trial of awake prone positioning if patient can be monitored or can self-rescue. Awake proning is contraindicated in patients in respiratory distress.
- Breathing exercises for breathlessness
- Consider home oxygen therapy (for those who may benefit)
- Breathing exercises for breathlessness
- Progressive ambulation as tolerated (if no contraindication)
- Intubation is recommended for severe respiratory failure:
  - Oxygenation goal for ventilated patients should be 92-96%.
  - Consider low tidal volume (VT) ventilation (VT 4-8 mL/kg of predicted body weight) over higher VT ventilation (VT >8 mL/kg) (AII).
- Target plateau pressures of <30 cm H2O (AII).
- A higher positive end-expiratory pressure (PEEP) strategy is recommended over a lower PEEP strategy (BII).
- For mechanically ventilated adults with refractory hypoxemia despite optimized ventilation, consider prone ventilation for 12 to 16 hours per day over no prone ventilation.

Step 7b - Pharmacologic Treatment
The following medications should be considered for treatment based on the patient’s severity and risk of disease progression.

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Consider home oxygen therapy (for those who may benefit)</td>
<td>❑ Oxygen support-nasal cannula, titrate up to 6L with an oxygen saturation goal of &gt;92%</td>
<td>❑ Intubation is recommended for severe respiratory failure:</td>
<td>❑ Oxygenation goal for ventilated patients should be 92-96%.</td>
</tr>
<tr>
<td>❑ Breathing exercises for breathlessness</td>
<td>❑ High-Flow Nasal Cannula (HFNC) or high-velocity therapy (titrated up to a flow of 60L and FiO2 up to 100%) are recommended over NIPPV</td>
<td>❑ Consider low tidal volume (VT) ventilation (VT 4-8 mL/kg of predicted body weight) over higher VT ventilation (VT &gt;8 mL/kg) (AII).</td>
<td>❑ Target plateau pressures of &lt;30 cm H2O (AII).</td>
</tr>
<tr>
<td>❑ Progressive ambulation as tolerated (if no contraindication)</td>
<td>❑ Non-Invasive Positive Pressure Ventilation (NIPPV) if HFNC not available</td>
<td>❑ A higher positive end-expiratory pressure (PEEP) strategy is recommended over a lower PEEP strategy (BII).</td>
<td>❑ For mechanically ventilated adults with refractory hypoxemia despite optimized ventilation, consider prone ventilation for 12 to 16 hours per day over no prone ventilation.</td>
</tr>
<tr>
<td>❑ Resting in the prone position if dyspneic</td>
<td>❑ Consider trial of awake prone positioning if patient can be monitored or can self-rescue. Awake proning is contraindicated in patients in respiratory distress.</td>
<td>❑ Consider using a conservative fluid strategy over a liberal fluid strategy (BII).</td>
<td>❑ Against the routine use of inhaled nitric oxide (AII).</td>
</tr>
<tr>
<td>❑ Adequate rest/sleep</td>
<td></td>
<td>❑ Insufficient Data to recommend for or against ECMO in these patients.</td>
<td></td>
</tr>
<tr>
<td>❑ Balanced diet</td>
<td></td>
<td>❑ Against the routine use of inhaled nitric oxide (AII).</td>
<td></td>
</tr>
<tr>
<td>❑ Adequate hydration</td>
<td></td>
<td>❑ Against the routine use of inhaled nitric oxide (AII).</td>
<td></td>
</tr>
</tbody>
</table>

**Insufficient Evidence**
At this time there is insufficient data to recommend for or against the following medications for SARS-CoV-2 (COVID-19):
- Colchicine
- Furoxamine
- Herbal medications
- Ivermectin
- Vitamin D

**DO NOT USE**
The following are recommended AGAINST for the treatment of SARS-CoV-2 (COVID-19) at the time of publication of this tool:
- Anti-interleukin-6 receptor monoclonal antibodies (except tocilizumab) (e.g., sarilumab, tocilizumab) or anti-IL-6 monoclonal antibody (siltuximab), except in a clinical trial (BII).
- Azithromycin alone (AII)
- Chloroquine or hydroxychloroquine with or without azithromycin (AII)
- Lopinavir/ritonavir (AII) or other HIV protease inhibitors (AII) except in a clinical trial
- Zinc supplementation above the recommended daily dietary allowance for the prevention of COVID-19, except in a clinical trial (BII)
This page represents a list of phrases that clinicians may want to utilize within their EMR documentation. It is broken down based on the steps that are outlined on the prior pages of this tool. EMR and IT vendors may want to utilize these phrases, along with specific data that is selected by clinicians as they utilize electronic versions of this tool.

☐ The ACEP Emergency Department COVID-19 Management Tool was utilized to assist in the decision process on how to best manage this patient. This tool is a pragmatic approach to management of patient's with suspected or confirmed SARS-CoV-2 in the emergency department. It is based on guidelines from the CDC, NIH, and additional published studies. COVID-19 is a novel pandemic and as such evidence is rapidly evolving on the best way to manage patients with this condition.

### SMART PHRASES

<table>
<thead>
<tr>
<th>Step 1 - Severity</th>
<th>Severity Classification was determined based on NIH criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MILD</strong></td>
<td>☐ Based on the criteria present at the time of evaluation, the patient was determined to have MILD Severity.</td>
</tr>
<tr>
<td><strong>MODERATE</strong></td>
<td>☐ Based on the criteria present at the time of evaluation, the patient was determined to have MODERATE Severity.</td>
</tr>
<tr>
<td><strong>SEVERE</strong></td>
<td>☐ Based on the criteria present at the time of evaluation, the patient was determined to have SEVERE Severity.</td>
</tr>
<tr>
<td><strong>CRITICAL</strong></td>
<td>☐ Based on the criteria present at the time of evaluation, the patient was determined to have CRITICAL Severity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2 - Risk Prognostication</th>
<th>☐ The PRIEST Score, a validated tool to determine the risk of mortality and/or end-organ failure, was utilized to assess the patient's risk of disease progression.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIEST Score</td>
<td>☐ Based on a PRIEST Score of _____ the patient is estimated to have a _____% risk.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3 - Risk Assessment</th>
<th>☐ A Risk Assessment was performed that considers additional factors that have been shown in published studies to increase a patient’s risk for disease progression.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Risk Factors</td>
<td>☐ Patient did not have any additional risk factors based on those included within this tool.</td>
</tr>
<tr>
<td>1 Risk Factor</td>
<td>☐ Patient was noted to have an additional risk factor.</td>
</tr>
<tr>
<td>2 (or more) Risk Factors</td>
<td>☐ Patient was noted to have 2 (or more) additional risk factors.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4 - Diagnostic Testing</th>
<th>☐ Appropriate Diagnostic Testing was performed on the patient based on their severity and risk of disease progression.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD... no additional testing obtained</td>
<td>☐ No diagnostic testing was obtained, because the patient was noted to have MILD severity, ≤4 on the PRIEST Score, and ≤1 additional risk factors.</td>
</tr>
<tr>
<td>Exertional O2</td>
<td>Negative: ☐ An O2 saturation was obtained after the patient exerted themselves for &gt;1 minute. Their SpO2 stayed stable.</td>
</tr>
<tr>
<td></td>
<td>Positive: ☐ An O2 saturation was obtained after the patient exerted themselves for &gt;1 minute. Their SpO2 dropped &gt;3%.</td>
</tr>
<tr>
<td>Imaging / Labs Obtained</td>
<td>☐ Appropriate imaging and labs were obtained in the emergency department based on clinical assessment of the patient.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 5 - Diagnostic Interpretation</th>
<th>☐ The Diagnostic Interpretation of imaging and labs that were obtained was as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO Concerning Imaging/Labs</td>
<td>☐ There was no concern on imaging or labs.</td>
</tr>
<tr>
<td>Concerning Imaging</td>
<td>☐ There was a concerning finding discovered on imaging that may prognosticate an increase in the patient’s risk of disease progression.</td>
</tr>
<tr>
<td>Concerning Lab</td>
<td>☐ There was a concerning finding discovered on lab testing that may prognosticate an increase in the patient’s risk of disease progression.</td>
</tr>
<tr>
<td>Multiple Concerning Imaging/ Labs</td>
<td>☐ There were multiple imaging and/or lab testing results that may prognosticate an increase in the patient's risk of disease progression.</td>
</tr>
</tbody>
</table>
### SMART PHRASES (continued)

#### Step 6 - Disposition

<table>
<thead>
<tr>
<th>MILD</th>
<th>Discharge Home</th>
<th>PRIEST ≤4 AND ≤1 Risk Factors</th>
<th>Discharge Home</th>
<th>Patients with MILD Severity, a low PRIEST Score, and ≤1 risk factors are appropriate for Discharge Home.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODERATE</td>
<td>Discharge Home</td>
<td>Patients with MILD Severity who have an elevated PRIEST Score (≥5) and/or multiple risk factors, may still be discharged home. These patients should receive information on their elevated risk for Severe disease and should be followed with early follow-up.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEVERE</td>
<td>Admission</td>
<td>Patients with MODERATE Severity, a low PRIEST Score, and ≤1 risk factors may be Discharged Home based on an emergency physician’s clinical judgement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Admission</td>
<td>Patients with MODERATE Severity and an elevated PRIEST Score or the presence of risk factors for disease progression meeting criteria for Hospital Admission.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Reduced Capacity</td>
<td>At times of COVID volume surges or reductions in hospital bed capacity, some patients who would normally meet criteria to hospital admission, may need to be Discharged Home.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Admission</td>
<td>Patients with SEVERE Severity meet criteria for admission to the hospital.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Transfer</td>
<td>Transfer should be considered if you are at a facility that does not have the resources or capacity to care for a patient with SEVERE Severity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>ECMO</td>
<td>Transfer may be considered to an ECMO facility if, based on clinical judgement, it is determined that the patient may benefit from this procedure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRITICAL</td>
<td>AMA</td>
<td>The patient signed out Against Medical Advice, despite the offer of admission to the hospital and treatment due to the severity of their COVID manifestation. The patient is of normal mentation and has the capacity to make this decision, while understanding the consequences to their health.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Step 7a - Non-Pharmacologic Treatment

<table>
<thead>
<tr>
<th>MILD / MODERATE</th>
<th>Discharged Home</th>
<th>The patient was supplied with discharge instructions that includes activities (breathing exercises, balanced diet, etc.) they should consider at home.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD / MODERATE</td>
<td>Home O2</td>
<td>The patient was given a prescription for supplemental O2 at home.</td>
</tr>
<tr>
<td>MILD / MODERATE</td>
<td>Home Pulse Oximetry</td>
<td>The patient was given instructions for how to use a pulse oximeter at home to measure periodically their oxygen levels. They were given clear instructions on what measurements would warrant a return to the emergency department.</td>
</tr>
<tr>
<td>SEVERE</td>
<td>02 via NC</td>
<td>Supplemental oxygen was administered to the patient via nasal cannula. The patient was monitored for response to therapy.</td>
</tr>
<tr>
<td>SEVERE</td>
<td>HFNC</td>
<td>Additional oxygen was delivered via High-Flow Nasal Cannula (HFNC) per institutional protocol.</td>
</tr>
<tr>
<td>SEVERE</td>
<td>NIPPV</td>
<td>Additional oxygen was delivered via Non-Invasive Positive Pressure Ventilation (NIPPV) per institutional protocol.</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Awake Proning</td>
<td>The patient was trialed on awake proning per institutional protocol.</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Intubation</td>
<td>Due to the patient’s CRITICAL Severity and compromised respiratory status, they were intubated.</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Prone Ventilation</td>
<td>Prone ventilation was utilized per institutional protocol.</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Conservative Fluids</td>
<td>Per NIH recommendations, a conservative fluid strategy was utilized.</td>
</tr>
</tbody>
</table>

#### Step 7b - Pharmacologic Treatment

<table>
<thead>
<tr>
<th>MILD / MODERATE</th>
<th>Monoclonal Antibodies</th>
<th>Monoclonal antibodies may be considered for patients with MILD or MODERATE Severity who have risk factors for disease progression based on the current EUA criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD / MODERATE</td>
<td>Steroids</td>
<td>Steroids are not recommended for patients with MILD or MODERATE Severity.</td>
</tr>
<tr>
<td>MILD / MODERATE</td>
<td>Remdesivir</td>
<td>Remdesivir is not recommended for patients with MILD or MODERATE Severity.</td>
</tr>
<tr>
<td>PATIENTS WHO ARE ADMITTED</td>
<td>Anticoagulation</td>
<td>Prophylactic dose anticoagulation is recommended for all nonpregnant adults who are admitted to the hospital.</td>
</tr>
<tr>
<td>PATIENTS WHO ARE ADMITTED</td>
<td>Remdesivir</td>
<td>Remdesivir may be given alone to admitted patients who require minimal supplemental oxygen.</td>
</tr>
<tr>
<td>SEVERE / CRITICAL</td>
<td>Dexamethasone PLUS Remdesivir</td>
<td>Dexamethasone PLUS remdesivir should be considered for patients who require increasing amounts of oxygen.</td>
</tr>
<tr>
<td>SEVERE / CRITICAL</td>
<td>Dexamethasone</td>
<td>Dexamethasone may be given alone when combination therapy with remdesivir cannot be used or is not available.</td>
</tr>
<tr>
<td>SEVERE / CRITICAL</td>
<td>Baricitinib PLUS Remdesivir</td>
<td>In the rare circumstances where corticosteroids cannot be used, Baricitinib can be given in combination with remdesivir for patients who require increasing amounts of oxygen.</td>
</tr>
<tr>
<td>SEVERE / CRITICAL</td>
<td>Dexamethasone NOT available</td>
<td>Alternative corticosteroids (such as prednisone, methylprednisolone, or hydrocortisone) can be used if dexamethasone is not available.</td>
</tr>
<tr>
<td>SEVERE / CRITICAL</td>
<td>Tocilizumab</td>
<td>Tocilizumab in combination with dexamethasone is recommended selected hospitalized patients who are exhibiting rapid respiratory decompensation due to COVID-19.</td>
</tr>
</tbody>
</table>
Emergency Department COVID-19 Management Tool

FOOTNOTES

Step 1 - Severity

- All severity classifications are outlined by the NIH. The NIH COVID-19 Treatment Guidelines Panel is a multi-disciplinary team of experts that meets routinely to discuss the impact of new evidence on best practices in addition to providing a standardized system for classifying clinical severity.

Step 2 - Risk Prognostication

- The PRIEST Score is a validated tool to predict a patient's risk for end organ failure and/or mortality.

Step 3 - Risk Assessment

The CDC maintains a reference for medical conditions associated with high risk for severe COVID-19.

- Race/Ethnicity and access to healthcare: the CDC has more information on how race, ethnicity, and access to health care resources may affect outcomes.
- Economic Disparity: has been shown to be an independent variable of risk.
- Cancer: especially those with recent diagnosis <1 year (OR 1.72) and/or hematologic malignancies (OR 2.8).
- Cardiovascular: OR 3.4 mortality, 3.4 higher level of care.
- Chronic Respiratory Disease: OR 1.6 - 3.7 mortality
- Diabetes: OR 1.9 mortality: 1.8-2.1 higher level of care.
- Down’s Syndrome: OR 10.4 mortality (independent of other variables).
- Hypertension: OR 2.5 mortality, 3 higher level of care.
- Immunosuppression: OR 1.3 (asplenia): - 3.5 (immunosuppression) mortality.
- Neurologic disease / Stroke / Dementia: OR 2.2 (stroke / dementia) - 2.6 (other neurologic disease) mortality.
- Obesity (BMI ≥35): FDA EUAs for AB use ≥35 for BMI cutoff.
- Pulmonary US (POCUS): is appropriate as a COVID rule-in test (with diagnostic accuracy similar to CT but should not be used for risk classification).
- Race/Ethnicity and access to healthcare: has been shown to be an independent variable of risk.
- Renal Disease (GFR ≤30): OR 2.5 - 4.3 mortality.

Step 4 - Diagnostic Testing

- Exertional SpO2: post-exertional SpO2 may provide modest prognostic information of adverse outcome at 30 days.
- Optimal time interval is not established.
- Some have suggested 1-2 minutes and a sit-stand option in the patient’s room (due to COVID restrictions).
- A 3% drop has been used in several studies.
- Another study used a quick walk test of 6 minutes. Decrease in ≥3% or ≥5% (conservative cutoff or postexercise ≤90% suggest poor outcome (need for mechanical ventilation) with LR+=3.5 and LR-=0.22.
- Diagnostic Testing: labs and imaging may be of assistance in determining patients risk for disease progression and mortality (Zhou F, Cummings MZ; Wynants L; Galloway JB; Zhao Z).
- The NIH maintains recommendations for appropriate diagnostic testing.
- The following represents a practical imaging approach and a consensus guideline.

Step 5 - Diagnostic Interruption

Imaging Interpretation

- Pulmonary US (POCUS) is appropriate as a COVID rule-in test (with diagnostic accuracy similar to CT) but should not be used for risk classification.
- Models to prognostic risk based on CXR results have been published.

Lab Interpretation

- ALT (≥40 U/L) is associated with increased mortality.
- AST (≥40 U/L) is associated with increased mortality.
- Creatinine (≥133 μmol/L) is associated with increased mortality.
- CRP (≥125 mg/L) is associated with increased mortality and intubation within 48-hours.
- D-dimer (≥1µg/mL) is associated with increased mortality.
- Ferritin (≥300 μg/L) is associated with increased mortality and worsening oxygenation within 48-hours.
- LDH (≥250 U/L) is associated with increased mortality and worsening oxygenation.
- Lymphopenia (≤0.8 x10⁹/L) is associated with increased mortality and lower level of care.
- Neutrophils (≥8,000/mm³) is associated with increased mortality.
- Thrombocytopenia (≤150,000/mm³) is associated with increased mortality and higher level of care.
- Tropinin (≥99%) is associated with increased mortality.
- WBC (≥10,000/ mm³) is associated with increased mortality.

Step 6 - Disposition

Discharge of select COVID patients with Home Oxygen has been shown to be associated with low rates of mortality and return admission.

The CDC maintains Patient Educational Materials.

Helpful links from JAMA include:
- What does this mean for families?
  - https://jamanetwork.com/journals/jamafullarticle/2763176
- Masks
  - https://jamanetwork.com/journals/jama/fullarticle/2764955
- Stopping the spread
  - https://jamanetwork.com/journals/jama/fullarticle/2763533
- What is herd immunity?
  - https://jamanetwork.com/journals/jama/fullarticle/2772168

Step 7a - Non-Pharmacologic Treatment

Home Supplemental O2

Discharge of select COVID patients with Home Oxygen has been shown to be associated with low rates of mortality and return admission.

Studies in COVID and other viral illnesses, have shown the benefit of:
- Rest
- Healthy diet
- Adequate sleep
- Exercise

Issues with SpO2 measurements

- If sending patients home with instructions for pulse oximetry, be mindful that SpO2 readings should always be considered an estimate of oxygen saturation. The FDA has just issued precautions on SpO2 devices.
- If an FDA-cleared pulse oximeter reads 90%, then the true oxygen saturation in the blood is generally between 86-94%. Pulse oximeter accuracy is highest at saturations of 90-100%, intermediate at 80-90%, and lowest below 80%.
- Additionally, SpO2 measurements have been shown not be as reliable in patients with pigmentation of their skin.

Treatment of Severe and Critical patients

- Recommendations for respiratory support, IV fluids, and other interventions are maintained by the NIH HERE.

Step 7b - Pharmacologic Treatment

Medications - recommendations are maintained by the NIH and IDSA.

Monoclonal Antibodies

Please read this advisory on the use of Monoclonal Antibodies:

NIH

Rating of Recommendations

- A = Strong
- B = Moderate
- C = Optional

Rating of Evidence

- I = One or more randomized trials without major limitations
- IIa = Other randomized trials or subgroup analyses of randomized trials
- IIb = Nonrandomized trials or observational cohort studies
- III = expert opinion
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CITATIONS

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