Emergency Department COVID-19 Management Tool

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.
- For information on pediatric MIS-C protocols (CHOP, Minnesota, and Yale) and suggestion against Monoclonal Antibodies.
- 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 (including differences in severity that may occur with evolving variants) is changing quickly and may alter recommendations.

A digitized version of this tool can now be found at MDCalc

**Step 1 - Severity Classification**

Assess the patient’s severity of disease utilizing NIH criteria.

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals who have various signs and symptoms of COVID-19 (ANY):</td>
<td>Individuals who show evidence of lower respiratory disease during (ANY):</td>
<td>Individuals who have (ANY):</td>
<td>Individuals with (ANY):</td>
</tr>
<tr>
<td>- Fever</td>
<td>- Clinical assessment</td>
<td>- Respiratory failure</td>
<td>- Respiratory failure</td>
</tr>
<tr>
<td>- Cough</td>
<td>- Imaging</td>
<td>- Septic shock</td>
<td>- Septic shock</td>
</tr>
<tr>
<td>- Sore throat</td>
<td>- AND who have:</td>
<td>- Multiorgan dysfunction or failure</td>
<td>- Multiorgan dysfunction or failure</td>
</tr>
<tr>
<td>- Malaise</td>
<td>- SpO2 &lt;94% on room air at sea level (in those with normal baseline SpO2 at rest)</td>
<td>- Sepsis</td>
<td>- Sepsis</td>
</tr>
<tr>
<td>- Headache</td>
<td>- Ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) &lt;200 mm Hg (if ABG obtained)</td>
<td>- Acute respiratory failure</td>
<td>- Acute respiratory failure</td>
</tr>
<tr>
<td>- Muscle pain</td>
<td>- RR &gt;30 breaths/min</td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>- Nausea, vomiting, diarrhea</td>
<td>- Lung infiltrates &gt;50%</td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>- Loss of taste and smell</td>
<td></td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>BUT who do NOT have (ANY):</td>
<td></td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>- Shortness of breath</td>
<td></td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>- Dyspnea</td>
<td></td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</td>
</tr>
<tr>
<td>- Abnormal chest imaging (if obtained)</td>
<td></td>
<td>- Multiorgan failure</td>
<td>- Multiorgan failure</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 patients risk for end organ failure and/or mortality.

The ACEP working group recognizes that there are other risk prognostication calculators that have been published. The PRIEST Score is included here as it offers a pragmatic approach with variables that don’t require diagnostic testing and don’t overlap with medical conditions that are within the separate risk assessment section.

The PRIEST Score is a validated tool to predict a patient’s risk for end organ failure and/or mortality. The PRIEST Score is included here as it offers a pragmatic approach with variables that don’t require diagnostic testing and don’t overlap with medical conditions that are within the separate risk assessment section.

### Variable

<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>12-20</td>
<td>9-11</td>
<td>21-24</td>
<td>&lt;9 or &gt;24</td>
</tr>
<tr>
<td>Oxygen saturation (%)</td>
<td>&gt;95</td>
<td>94-95</td>
<td>92-93</td>
<td>&lt;92</td>
</tr>
<tr>
<td>Heart rate (per minute)</td>
<td>51-90</td>
<td>41-50 or 91-110</td>
<td>111-130</td>
<td>&lt;41 or &gt;130</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>111-219</td>
<td>101-110</td>
<td>91-100</td>
<td>&lt;91 or &gt;219</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>36.1-38.0</td>
<td>35.1-36.0 or 38.1-39.0</td>
<td>&gt;39.0</td>
<td>&lt;35.1</td>
</tr>
<tr>
<td>Alertness</td>
<td>Alert</td>
<td>Male</td>
<td>Supplemental Oxygen</td>
<td>Confused</td>
</tr>
<tr>
<td>Inspired oxygen</td>
<td>Room Air</td>
<td>Limited activity, can self-care</td>
<td>Limited self-care</td>
<td>Bed/chair bound, no self-care</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>Limited activity, can self-care</td>
<td>Limited self-care</td>
<td>Bed/chair bound, no self-care</td>
</tr>
<tr>
<td>Age (years)</td>
<td>16-49</td>
<td>Unrestricted Normal Activity</td>
<td>50-65</td>
<td>&gt;80</td>
</tr>
<tr>
<td>Performance status</td>
<td>Limited strenuous activity, can do light activity</td>
<td>66-80</td>
<td>66-80</td>
<td>66-80</td>
</tr>
</tbody>
</table>

**Total number of boxes checked in each column**

\[ \text{Total Score} \]

<table>
<thead>
<tr>
<th>Add Subtotals</th>
<th>Score</th>
<th>0-1</th>
<th>2-3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk %</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>9%</td>
<td>15%</td>
<td>18%</td>
<td>22%</td>
<td>26%</td>
<td>29%</td>
<td>34%</td>
<td>38%</td>
<td>47%</td>
<td>48%</td>
<td>50%</td>
<td>55%</td>
<td>66%</td>
<td></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.

The CDC notes that patient race/ethnicity, socioeconomic status, and healthcare resources may effect clinical outcomes and advise consideration in clinical risk assessment.

### 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)
Emergency Department COVID-19 Management Tool

September 2021

**Step 4 - Diagnostic Testing**

The following imaging and lab tests should be considered based on your patients' severity and risk for disease progression.

### Step 4 - Diagnostic Testing

#### Table: Diagnostic Testing

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on clinician's judgement, diagnostic testing may not be necessary in patients with (ALL):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Mild Severity</td>
<td>☐ PRIEST score ≤4</td>
<td>☐ 1 or less Risk Factors</td>
<td>☐ Exertional SpO2 may have limited ability to identify adverse outcomes in otherwise well-appearing patients:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per the NIH...</td>
<td>Imaging: the optimal imaging technique has not yet been defined for people with symptomatic COVID-19. Initial evaluation for these patients may include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐ Chest X-ray</td>
<td>☐ Pulmonary Ultrasound</td>
<td>☐ CT Chest (if indicated)</td>
</tr>
<tr>
<td>ECG: should be performed if indicated</td>
<td>☐ ECG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labs:</td>
<td>☐ CBC w/ differential</td>
<td>☐ CMP</td>
<td></td>
</tr>
<tr>
<td>While not standard of care, the following may have prognostic value:</td>
<td>☐ CRP</td>
<td>☐ D-dimer</td>
<td>☐ Ferritin</td>
</tr>
</tbody>
</table>

### 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.

**Lab Cutoffs:**

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ ALT (&gt;40 U/L)</td>
<td>☐ AST (&gt;40 U/L)</td>
<td>☐ Creatinine (&gt;1.5 mg/dL)</td>
<td>☐ CRP (&gt;125 mg/L)</td>
</tr>
<tr>
<td>☐ D-dimer (&gt;1μg/mL)</td>
<td>☐ Ferritin (&gt;300 μg/L)</td>
<td>☐ LDH (&gt;250 U/L)</td>
<td>☐ Lymphopenia (&lt;0.8 x10⁹/L)</td>
</tr>
<tr>
<td>☐ Neutrophils (&gt;8,000/mm³)</td>
<td>☐ Thrombocytopenia (&lt;150,000/mm³)</td>
<td>☐ Troponin (&gt;99%)</td>
<td>☐ WBC (&gt;10,000/ mm³)</td>
</tr>
</tbody>
</table>

### Step 6 - Disposition

The following represents a pragmatic approach for disposition of patients depending on their disease severity. Clinicians 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.

**Step 6 - Disposition**

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Discharge Home</td>
<td>☐ Discharge Home, consider if ALL:</td>
<td>Admission Location:</td>
<td>Admission</td>
</tr>
<tr>
<td>☐ Consider</td>
<td>☐ PRIEST Score ≤4</td>
<td>based on clinician's judgement</td>
<td>☐ ICU</td>
</tr>
<tr>
<td>☐ Home pulse oximetry</td>
<td>☐ 1 (or less) Risk Factors</td>
<td>☐ Floor Bed</td>
<td>☐ Transfer</td>
</tr>
<tr>
<td>☐ Consider</td>
<td>☐ No concerning Imaging or Lab results</td>
<td>☐ Intermediate</td>
<td>☐ Consider transfer if your facility does not have the resources or capacity to care for a critically ill COVID patient.</td>
</tr>
<tr>
<td>☐ Clinicians should consider early follow-up with primary care physician or other health system access points.</td>
<td>☐ Capability and resources to care for self at home</td>
<td>☐ ICU</td>
<td></td>
</tr>
<tr>
<td>☐ Patient should be educated on their increased risk for severe disease and precautions to return to the ED.</td>
<td>☐ No other condition that warrants admission</td>
<td>☐ Admission Location:</td>
<td>☐ Consider transfer to an ECMO facility for patients who may benefit from this after consultation with receiving facility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>based on clinician's judgement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Observation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Inpatient Floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Intermediate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ At times of surge and capacity constraints some patient who would normally be admitted to the hospital, may need to be sent home:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Supply patient with educational materials on precautions and items to be monitoring at home (CDC Patient Educational Materials)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Follow-up visit arranged via PCP or tele-health</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Consider home pulse oximetry</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Consider home oxygen therapy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Patient wishes to leave Against Medical Advice (AMA) for admission to the hospital and/or additional therapeutic treatment.</td>
<td></td>
</tr>
</tbody>
</table>

**Imaging:**

Per the NIH...

**ECG:**

should be performed if indicated

**Labs:**

warrant admission

**Admission Location:**

based on clinician’s judgement

**Transfer**

Consider transfer if your facility does not have the resources or capacity to care for a critically ill COVID patient.

**AMA**

Patient wishes to leave Against Medical Advice (AMA) for admission to the hospital and/or additional therapeutic treatment.
**Step 7a - Non-Pharmacologic Treatment**

The following treatments should be considered based on your 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</td>
<td>Oxygen support-nasal cannula</td>
<td>Intubation is recommended for severe respiratory failure:</td>
<td></td>
</tr>
<tr>
<td>(for those who may benefit)</td>
<td>up to 6 L with an oxygenation goal</td>
<td>Oxygenation goal for ventilated patients</td>
<td>Consider low tidal volume (VT) ventilation</td>
</tr>
<tr>
<td>Breathing exercises for</td>
<td>of &gt; 92%</td>
<td>should be 92-96%.</td>
<td>(VT 4–8 mL/kg of predicted body weight) over</td>
</tr>
<tr>
<td>breathlessness</td>
<td>High-Flow Nasal Cannula (HFNC) or</td>
<td>higher VT ventilation (VT &gt;8 mL/kg) (Al).</td>
<td>higher VT ventilation (VT &gt;8 mL/kg) (Al).</td>
</tr>
<tr>
<td>Progressive ambulation as</td>
<td>high-velocity therapy (titrated up</td>
<td>Discriminate between ventilated adults without ventilation and classifying them according to the guidelines.</td>
<td></td>
</tr>
<tr>
<td>tolerated (if no contraindication)</td>
<td>to a flow of 60L and FiO2 up to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resting in the prone position</td>
<td>100%) are recommended over NIPPV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>if dyspneic</td>
<td>Non-Invasive Positive Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate rest/sleep</td>
<td>Ventilation (NIPPV) if HFNC not</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balanced diet</td>
<td>available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate hydration</td>
<td>Consider trial of awake prone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>positioning if patient can be</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>monitored or can self rescue.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Awake proning is contraindicated in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>patients in respiratory distress.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 7b - Pharmacologic Treatment**

The following medications should be considered for treatment based on the patient’s severity and risk of disease progression. Pharmacologic recommendations for patients with COVID-19 are evolving quickly. For the latest updates and details visit the NIH or IDSA Guidelines.

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
<th>CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoclonal Antibodies</td>
<td>Steroids and/or Remdesivir</td>
<td>One of the following options is recommended for these patients:</td>
<td></td>
</tr>
<tr>
<td>Recommendation for use in</td>
<td>One of the following options is</td>
<td>Remdesivir* alone (e.g., for patients who require minimal supplemental oxygen) (Bila).</td>
<td></td>
</tr>
<tr>
<td>outpatients with mild to moderate</td>
<td>recommended for these patients:</td>
<td>Dexamethasone PLUS remdesivir* (e.g., for patients who require increasing amounts of oxygen) (Bili).</td>
<td></td>
</tr>
<tr>
<td>COVID-19 who are at high risk of</td>
<td>Steroids alone (e.g., when combination therapy with remdesivir cannot be used or is not available) (Bili).</td>
<td>Dexamethasone alone (e.g., when combination therapy with remdesivir cannot be used or is not available) (Bili).</td>
<td></td>
</tr>
<tr>
<td>clinical progression as defined by</td>
<td>*Remdesivir should be used only in patients requiring supplemental O2 but not O2 through a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or ECMO.</td>
<td>*Remdesivir should be used only in patients requiring supplemental O2 but not O2 through a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or ECMO.</td>
<td></td>
</tr>
<tr>
<td>the EUA criteria (see footnote).</td>
<td>In the rare circumstances where corticosteroids cannot be used:</td>
<td>In the rare circumstances where corticosteroids cannot be used:</td>
<td></td>
</tr>
<tr>
<td>- (Listed in alphabetical order):</td>
<td>Baricitinib in combination with</td>
<td>Baricitinib in combination with remdesivir</td>
<td></td>
</tr>
<tr>
<td>casirivimab 600 mg plus</td>
<td>remdesivir (Bili) (e.g., for patients who require increasing amounts of oxygen) (Bili).</td>
<td>(e.g., for patients who require increasing amounts of oxygen) (Bili).</td>
<td></td>
</tr>
<tr>
<td>imdevimab 600 mg IV (Alila), or</td>
<td>in combination with remdesivir</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sotrovimab 500mg IV.</td>
<td>- IL-1 inhibitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Bamlanivimab 700mg plus etesevimab 1,400 mg may also be used but are not authorized for use in states, territories, and US jurisdictions in which the combined frequency of variants resistant to bamlanivimab and etesevimab exceeds 5% (click HERE to authorize locales).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- For casirivimab: plus imdevimab, when IV infusion is not feasible or would lead to delay in treatment, subcutaneous (SQ) injection of casirivimab 600 mg plus imdevimab 600 mg can be used as an alternative route of administration (Bili) (2.5 mL x 4 injections at different sites).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Treatment should be started as</td>
<td>- Lopinavir/ritonavir (AI) or other HIV protease inhibitors (AI) except in a clinical trial (Bili).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>soon as possible after the patient has a positive result on a SARS-CoV-2 antigen or nucleic acid amplification test and within 10 days of symptom onset.</td>
<td>- Nitazoxanide (BIIa), except in a clinical trial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- See the Footnotes page for links to the FDA fact sheets with information on which steroids qualify and may benefit from AB therapy.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Stressors**

Dexamethasone (or other corticosteroids) should NOT be initiated in these patients (Mild: AIII, Moderate: AIIa)

**Remdesivir**

There is insufficient evidence to recommend either for or against the routine use of remdesivir in hospitalized mild/moderate COVID-19 patients.

**Insufficient Evidence**

At this time there is insufficient data to recommend either for or against the following medications for SARS-CoV-2 (COVID-19): Budesonide, Fluvoxamine, IL-1 inhibitors, 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) or anti-IL-6 monoclonal antibody (siltuximab), except in a clinical trial (Bii).
- Azithromycin alone (AI)
- Chloroquine or hydroxychloroquine with or without azithromycin (AI)
- Colchicine (InPt) (AI)
- Famotidine, except in a clinical trial
- Lopinavir/ritonavir (AI) or other HIV protease inhibitors (AI) except in a clinical trial
- Nitazoxanide (Bila), except in a clinical trial
- Zinc supplementation above the recommended daily dietary allowance for the prevention of COVID-19, except in a clinical trial (Bili)

**Anticoagulation**

Admitted nonpregnant adults should receive prophylactic dose anticoagulation (AII)

**Insufficient Evidence**

At this time there is insufficient data to recommend either for or against the following medications for SARS-CoV-2 (COVID-19):

- Budesonide
- Colchicine (OutPt)
- Herbal medications
- Interferon beta
- Vitamin D
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

**Step 1 - Severity**

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

**Step 2 - Risk Prognostication**

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.

**PRIEST Score**

Based on a PRIEST Score of _____ the patient is estimated to have a ______% risk.

**Step 3 - Risk Assessment**

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.

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>0 Risk Factors</th>
<th>1 Risk Factor</th>
<th>2 (or more) Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient did not have any additional risk factors based on those included within this tool.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient was noted to have an additional risk factor.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient was noted to have 2 (or more) additional risk factors.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 4 - Diagnostic Testing**

Appropriate **Diagnostic Testing** was performed on the patient based on their severity and risk of disease progression.

<table>
<thead>
<tr>
<th>MILD... no additional testing obtained</th>
<th>Exertional O2</th>
<th>Imaging / Labs Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>No diagnostic testing was obtained, because the patient was noted to have <strong>MILD</strong> severity, ≤4 on the PRIEST Score, and ≤1 additional risk factors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>An O2 saturation was obtained after the patient exerted themselves for &gt;1 minute. Their SpO2 stayed stable.</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>An O2 saturation was obtained after the patient exerted themselves for &gt;1 minute. Their SpO2 dropped &gt;3%.</td>
<td></td>
</tr>
</tbody>
</table>

**Step 5 - Diagnostic Interpretation**

The **Diagnostic Interpretation** of imaging and labs that were obtained was as follows:

<table>
<thead>
<tr>
<th>NO Concerning Imaging/Labs</th>
<th>Concerning Imaging</th>
<th>Concerning Lab</th>
<th>Multiple Concerning Imaging/Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>There was no concern on imaging or labs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There was a concerning finding discovered on imaging that may prognosticate an increase in the patient’s risk of disease progression.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There was a concerning finding discovered on lab testing that may prognosticate an increase in the patient’s risk of disease progression.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There were multiple imaging and/or lab testing results that may prognosticate an increase in the patient’s risk of disease progression.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Step 6 - Disposition

<table>
<thead>
<tr>
<th>Severity Level</th>
<th>Discharge Status</th>
<th>Disposition Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD</td>
<td>Discharged Home</td>
<td>Patients with MILD Severity, a low PRIEST Score, and ≤1 risk factors are appropriate for Discharge Home.</td>
</tr>
<tr>
<td></td>
<td></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 connected with early follow-up.</td>
</tr>
<tr>
<td>MODERATE</td>
<td>Discharge Home</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>
</tr>
<tr>
<td></td>
<td>Admission</td>
<td>Patients with MODERATE Severity and an elevated PRIEST Score or the presence of risk factors for disease progression meet criteria for Hospital Admission.</td>
</tr>
<tr>
<td></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>
</tr>
<tr>
<td>SEVERE</td>
<td>Admission</td>
<td>Patients with SEVERE Severity meet criteria for admission to the hospital.</td>
</tr>
<tr>
<td></td>
<td>Transfer</td>
<td>Transfer should be considered if you are a facility that does not have the resources or capacity to care for a patient with SEVERE Severity.</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Transfer</td>
<td>Transfer should be considered if you are a facility that does not have the ICU resources or capacity to care for a patient with CRITICAL Severity.</td>
</tr>
<tr>
<td></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>
</tr>
<tr>
<td></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>
</tr>
</tbody>
</table>

### Step 7a - Non-Pharmacologic Treatment

- The following Non-Pharmacologic Treatments were ordered on the patient, based on best practice guidelines at the time of publication of this tool.

#### MILD / MODERATE

- **Discharged Home:** The patient was supplied with discharge instructions that includes activities (breathing exercises, balanced diet, etc.) they should consider at home.
- **Home O2:** The patient was given a prescription for supplemental O2 at home.
- **Home Pulse Oximetry:** 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.

#### SEVERE

- **O2 via NC:** Supplemental oxygen was administered to the patient via nasal cannula. The patient was monitored for response to therapy.
- **HFNC:** Additional oxygen was delivered via High-Flow Nasal Cannula (HFNC) per institutional protocol.
- **NIPPV:** Additional oxygen was delivered via Non-Invasive Positive Pressure Ventilation (NIPPV) per institutional protocol.

#### CRITICAL

- **Awake Proning:** The patient was trialed on awake proning per institutional protocol.

### Step 7b - Pharmacologic Treatment

- The following Pharmacologic Treatments were administered to the patient, based on NIH recommendations at the time of publication of this tool.

#### MILD / MODERATE

- **Monoclonal Antibodies:** 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.
- **Steroids:** Steroids are not recommended for patients with MILD or MODERATE Severity.

#### SEVERE / CRITICAL

- **Remdesivir:** Remdesivir may be given alone to admitted patients who require minimal supplemental oxygen.
- **Dexamethasone PLUS Remdesivir:** Dexamethasone PLUS remdesivir should be considered for patients who require increasing amounts of oxygen.
- **Dexamethasone:** Dexamethasone may be given alone when combination therapy with remdesivir cannot be used or is not available.
- **Baricitinib PLUS Remdesivir:** 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.
- **Dexamethasone NOT available:** Alternative corticosteroids (such as prednisone, methylprednisolone, or hydrocortisone) can be used if dexamethasone is not available.
- **Tocilizumab:** Tocilizumab in combination with dexamethasone is recommended selected hospitalized patients who are exhibiting rapid respiratory decomposition due to COVID-19.
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. 10
- The PRIEST Score can be accessed on MDCalc.

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. 15
- Economic Disparity: has been shown to be an independent variable of risk. 15
- Cancer*: especially those with recent diagnosis <1 year (OR 1.72) and/or hematologic malignancies (OR 2.8)11
- Cardiovascular: OR 3.4 mortality, 3.4 higher level of care 2
- Chronic Respiratory Disease: OR 1.6 11 - 3.7 mortality
- Diabetes: OR 1.9 mortality: 1.8-2.1 higher level of care 2,3
- Down’s Syndrome: OR 10.4 mortality (independent of other variables) 15
- Hypertension: OR 2.5 mortality, 3 higher level of care 2
- Immunosuppression / Asplenia: OR 1.3 (asplenia) - 3.5 (immunosuppression) mortality 11
- Neurologic disease / Stroke / Dementia: OR 2.2 (stroke / dementia) - 2.6 (other neurologic disease) mortality 2
- Obesity (BMI ≥35): FDA EUAs for AB use ≥35 for BMI cutoff
  - One study showed increased risk for mortality in those with BMI 40-44 (OR 2.7) and ≥45 kg (OR 4.2) 15
- Obstructive Sleep Apnea: OR 2.9 hospitalization, 2.4 severe disease 10
- Pregnancy: has been shown to have increased hospitalization (OR 3.5), 2
- Severe cases have been shown to have pre-term labor 45.4% compared to 6.9% of mild and recovered cases. 8
  - ACOG has published a guideline to assist with risk stratification of pregnant patients
- Renal Disease (GFR <30): OR 2.5 11 - 4.3 mortality 2

Step 4 - Diagnostic Testing

- Exertional SpO2: post-exertional SpO2 may provide modest prognostic information of adverse outcome at 30 days 5, 13, 21
  - 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) 6
  - A 3% drop has been used in several studies. 21, 13
  - 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. 21
- Diagnostic Testing: labs and imaging may be of assistance in determining patients risk for disease progression and mortality (Zhou F; Cummings MJ; Wynants L; Galloway JB; Zhao Z)
  - The NIH maintains recommendations for appropriate diagnostic testing.
  - The following represents a practical imaging approach 21 and a consensus guideline. 23

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. 24
- Models to prognostic risk based on CXR * results have been published.

Lab Interpretation

- ALT (>40 U/L) is associated with increased mortality. 2
- AST (>40 U/L) is associated with increased mortality. 2
- Creatinine (>133 μmol/L) is associated with increased mortality. 1
- CRP (>125 mg/L) is associated with increased mortality 27 and intubation within 48-hours. 27, 32
- D-dimer (>1μg/mL) is associated with increased mortality. 1
- Ferritin (>300 pg/mL) is associated with increased mortality and worsening oxygenation within 48-hours. 27, 32
- LDH (>250 U/L) is associated with increased mortality 27 and worsening oxygenation 29 and intubation within 48-hours. 29
- Lymphopenia (<0.8 x109/L) is associated with increased mortality and higher level of care. 2
- Neutrophils (>5,000/mm3) is associated with increased mortality. 2
- Thrombocytopenia (<150,000/mm3) is associated with increased mortality and higher level of care. 2
- Troponin (>99%) is associated with increased mortality. 2
- WBC (>10,000/mm3) is associated with increased mortality. 2

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. 21, 22, 24

The CDC maintains Patient Educational Materials.

Helpful links from JAMA include:

- What does this mean for families? https://jamanetwork.com/journals/jamapediatrics/fullarticle/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 25

Studies in COVID and other viral illnesses, have shown the benefit of:

- Rest 19
- Healthy diet 17
- Adequate sleep 10
- Exercise 19

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. 24
- 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. 20

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
Emergency Department COVID-19 Management Tool

September 2021

CITATIONS


Emergency Department COVID-19 Management Tool

September 2021

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