



OPINION PIECE

Defining Early and Late Clinical Outcomes in Patients with SARS-CoV-2 Pneumonia

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Opinion Piece

SARS-CoV-2 is now added to the list of respiratory viruses able to cause community-acquired pneumonia (CAP).[1] The clinical outcomes of hospitalized patients with non-SARS-CoV-2 CAP have been characterized as early outcomes—or outcomes occurring during the acute infection, and late outcomes—or outcomes occurring after the episode of acute pneumonia has resolved.[2]

The early clinical outcomes of hospitalized patients with SARS-CoV-2 CAP can be characterized as illustrated in **Figure 1**. Some patients develop SARS-CoV-2 infection from an exposure in the community, requiring subsequent hospitalization due to development of pneumonia. The initial severity of disease can be characterized in levels as depicted in **Figure 2**. These levels are suggested by the National Institutes of Health treatment guidelines for COVID-19.[3] During hospital follow-up, if the severity of the patient's illness decreases by two or more levels, they can be considered to be clinically improving. Conversely, if the severity of the patient's illness increases by two or more levels, they can be considered to be clinically deteriorating. In our prior studies of clinical outcomes in patients with non-SARS-CoV-2 CAP, we proposed 3 days as the cutoff for early and late outcomes, since the majority of patients with non-SARS-CoV-2 CAP have a hospitalization of 3–7 days.[4] In the case SARS-CoV-2 CAP, our data indicate that the hospitalization of these patients extends to 7–14 days.[5] Therefore, we have decided to define the cutoff between early and late outcomes at 7 days. After 14 days, if the patient remains without deterioration or improvement, their case will be considered

non-resolving SARS-CoV-2 CAP. At 30-day follow-up, the final early outcomes will be categorized as 1) discharged home fully recovered (optimal outcome), 2) discharged home partially recovered, 3) discharged to a rehabilitation facility, 4) discharged to a long-term care facility, 5) continued hospital care if the patient remains hospitalized at 30 days, 6) discharged to hospice, and 7) death. Discharge to hospice and death are considered the worst outcomes.

The late (post-discharge) outcomes of hospitalized patients with SARS-CoV-2 CAP can be characterized as described in **Figure 3**. If the patient is discharged home fully recovered (optimal outcome), and the patient remains asymptomatic during the 1-year follow-up, this will constitute the optimal outcome at 1 year. During this year, some patients will develop symptoms and may be re-hospitalized according to the severity of the symptoms. At intervals during the follow-up, patients will need to be evaluated in a post-COVID-19 clinic to determine whether any organ system has been affected by the acute illness. Since any organ system can be affected, the follow-up of these patients should occur in a multi-disciplinary clinic. At 1 year, outcomes will be determined according to the same levels as at the 30-day follow-up.

These classifications of the clinical course and post-acute sequelae of SARS-CoV-2 CAP fit nicely into the theoretical framework of multi-state modeling. This statistical methodology may enable researchers to predict what class and level of outcome a patient may experience over the year following diagnosis of SARS-CoV-2 pneumonia.

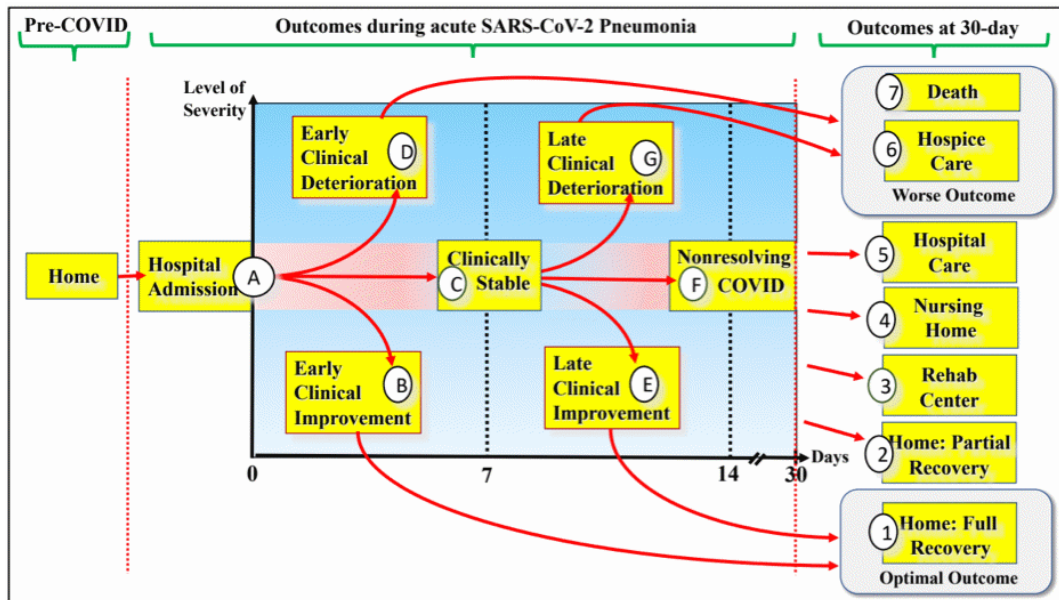


Figure 1. Early clinical outcomes for hospitalized patients with SARS-CoV-2 CAP.

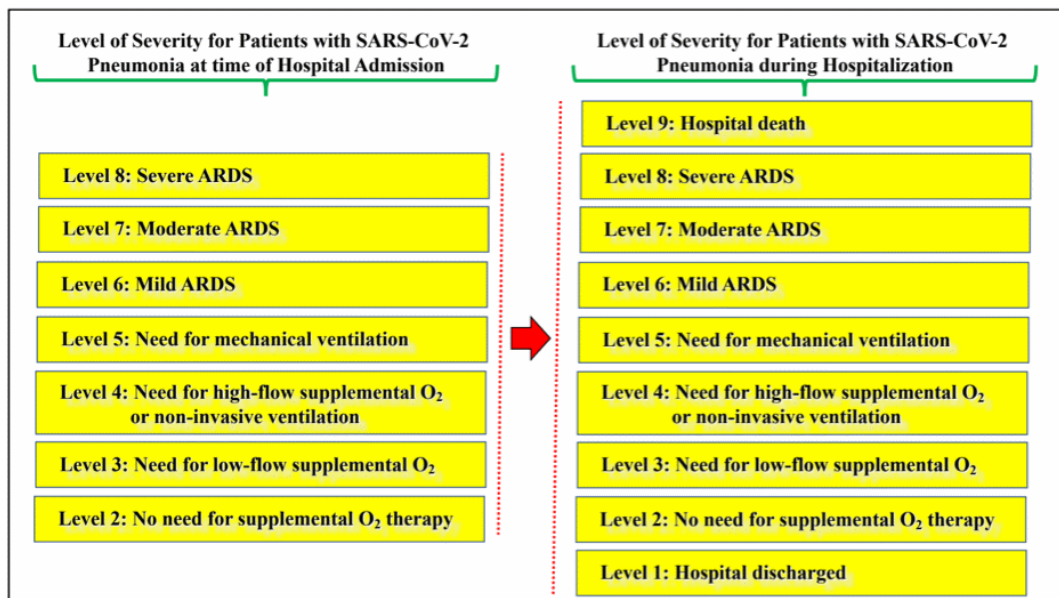


Figure 2. Levels of severity for hospitalized patients with SARS-CoV-2 CAP.

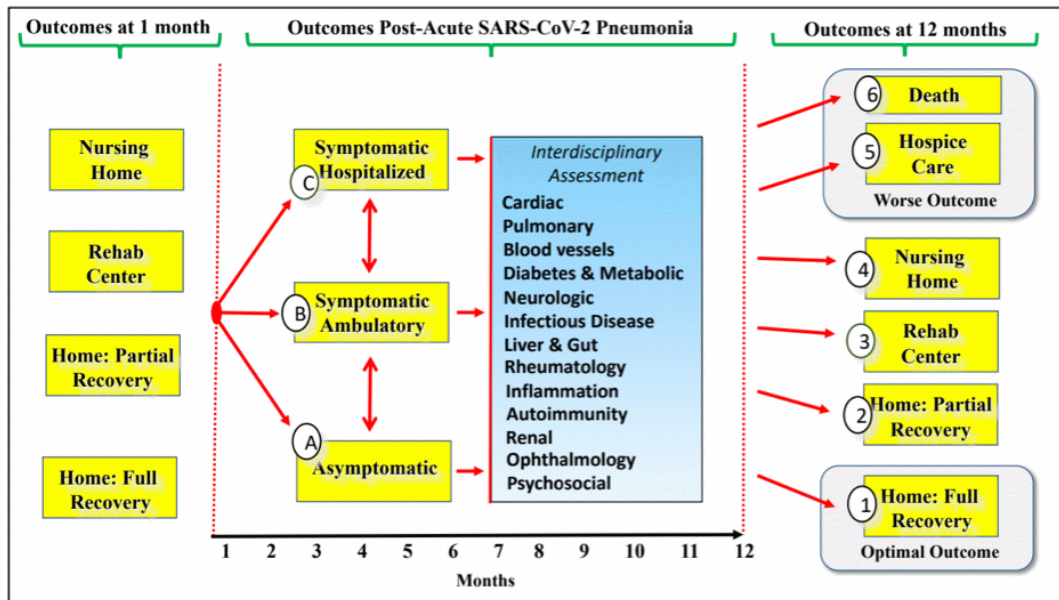


Figure 3. Long term outcomes for patients with SARS-CoV-2 CAP.

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