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**Using the Surviving Sepsis Coronavirus Disease 2019 Guidelines—Anything New Yet?****To the Editor:**

The pandemic from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the pathogen responsible for coronavirus disease 2019 (COVID-19), has lifted the importance of critical care medicine in emerging infectious diseases. The rapidly rising infection and death rates associated with COVID-19 has caused a surge capacity and forced critical care providers to manage patients with a rapidly evolving disease they are otherwise unfamiliar with. This has caused guidance and recommendations from authorities to be volatile and rapidly evolving. For example, the personal protective equipment and isolation recommendations from the World Health Organization (WHO) rapidly changed from universal N-95 respirator masks and airborne isolation to droplet isolation, contact precautions, and eye protection on patients not undergoing aerosolizing procedures.

The Surviving Sepsis Campaign (SSC) is a global, joint initiative aimed to reduce morbidity and mortality from sepsis. Due to the surge in ICU demand over the coming weeks, the (SSC) rapidly released guidelines on the management of critically ill adults with virus-induced sepsis due to COVID-19 (1). Since there is a scarcity in clinical trials or existing literature on COVID-19, the recommendations are swiftly evolving and likely to change.

Given the lack of direct evidence, randomized trials, or clinical experience, the SSC panel recommendations are mostly extrapolated from prior SSC guidelines (2). The nine strong recommendations are not specific to COVID-19 patients, but a generalized review of all septic patients: 1) use crystalloids over colloids for volume resuscitation; 2) avoid hydroxyethyl starch; 3) avoid dopamine if norepinephrine is available; 4) starting supplemental oxygen if peripheral oxygen saturation ( $\text{SpO}_2$ ) is less than 92%; 5)  $\text{SpO}_2$  be maintained no higher than 96%; 6) low tidal volume ventilation; 7) targeting plateau pressures of less than 30 cm  $\text{H}_2\text{O}$ ; 8) avoid the routine use of inhaled nitric oxide; and 9) avoid staircase, or incremental positive end-expiratory pressure (PEEP), recruitment maneuvers (Table 1).

Some areas where the SSC departed from prior recommendations are fitted respirator masks (N-95 respirators, filtered facepiece 2) and negative pressure rooms when performing aerosol-generating procedures; surgical/medical masks, as opposed to respirator masks, and droplet isolation when nonaerosol-generating

procedures are performed on mechanically ventilated patients or if the patient is nonventilated; use of endotracheal aspirates rather than bronchoalveolar lavage, bronchial wash, or sputum induction; adding vasopressin as a second-line agent over titrating norepinephrine dose for a mean arterial pressure target of 60–65 mm Hg; targeting oxygen saturations between 92% and 96% with the use of high-flow nasal cannula over conventional oxygen therapy and noninvasive positive pressure ventilation; use of a higher PEEP strategy; and the use of antipyretics. Although the evidence comes from studies not performed on COVID-19 patients, the novel recommendations may be an insight into the forthcoming 2020 SSC guidelines. The remainder of the recommendations were extrapolations from prior SSC guidelines without further existing data to suggest altering them.

Although steroids were recommended in refractory shock, it was discouraged in cases of respiratory failure without acute respiratory distress syndrome (ARDS) and no recommendation was given for cases of ARDS. Perhaps the reality is that this is an area where there are many strong opinions and a consensus could therefore not be reached. Future recommendations can hopefully allow for one harmonized decision.

Rapid progress is being made with diagnostic reagents, drug repurposing, and vaccine production, however, the panel had insufficient evidence to issue a recommendation on the use of: 1) corticosteroids in adults with ARDS; 2) antiviral agents; 3) recombinant interferon; 4) chloroquine or hydroxychloroquine; 5) tocilizumab; or 6) helmet noninvasive positive pressure ventilation (NIPPV) rather than mask NIPPV. Trials will soon show whether antibiotics, antivirals, antimalarials, or anti-inflammatory drugs either alone or in combination can curtail the viral pandemic. For example, a systematic review recently showed chloroquine seems to be effective in limiting the replication of in vitro COVID-19 (3). Data on this rapidly evolving topic will likely be discussed in the SCC COVID-19 living guidelines.

Optimal critical care is imperative in patients at the greatest risk of ARDS and death—age greater than 65 years, male gender, angiotensin-converting enzyme 2 (ACE2) expression, smokers, and patients with underlying chronic conditions (4–6). At this time, with the exception of a few caveats, critically ill patients with COVID-19 are generally treated the same as non-COVID-19 septic patients. COVID-19 patients with cerebrovascular disease, diabetes, hypertension, coronary heart disease, and patients on ACE2-increasing drugs are at a higher risk of requiring intensive care (7). Bilateral lung involvement, liver function damage, elevated lactate dehydrogenase, and  $\alpha$ -hydroxybutyrate dehydrogenase may be more frequently seen in COVID-19 patients (8). Contrary to the guidelines, Cheung et al (9) advise against the use of high-flow nasal cannula or noninvasive ventilation until the patient has viral clearance. Whether or not an autopsy is performed on a patient under investigation for COVID-19, postmortem clinical specimens should still be sent and tested for SARS-CoV-2.

**TABLE 1. Surviving Sepsis Campaign Recommendations on Coronavirus Disease 2019**

Recommendation	Grade/Strength	Extrapolation From Prior Guidelines?	New Data in Coronavirus Disease 2019 Guidelines?
Use crystalloids over colloids for volume resuscitation	Strong	Yes	No
Avoid hydroxyethyl starch	Strong	Yes	No
Avoid dopamine if norepinephrine is available	Strong	Yes	No
Start supplemental oxygen if $\text{SpO}_2$ is $< 92\%$	Strong	Yes	No
$\text{SpO}_2$ be maintained no higher than $96\%$	Strong	Yes	No
Low tidal volume ventilation;	Strong	Yes	No
Targeting plateau pressures of $< 30 \text{ H}_2\text{O}$	Strong	Yes	No
Avoid the routine use of inhaled nitric oxide	Strong	Yes	No
Avoid staircase (incremental positive end-expiratory pressure) recruitment maneuvers	Strong	Yes	No
Fitted respiratory masks (N-95 respirators, filtered facepiece 2) when performing aerosol-generating procedures	Best practice	No	Yes
Negative pressure rooms during aerosol-generating procedures	Best practice	No	Yes
Surgical/medical masks and droplet isolation if not mechanically ventilated or during nonaerosol-generating procedures	Weak	No	Yes
Endotracheal intubation by airway experienced providers	Best practice	Yes	No
Close monitoring for need of intubation if clinical status worsens while receiving NIPPV or high-flow nasal cannula	Best practice	Yes	No
Corticosteroids in adults with ARDS	None	Yes	Yes
Avoid corticosteroids in respiratory failure, not ARDS	Weak	No	Yes
Corticosteroids in refractory shock	Weak	Yes	No
Use of antiviral agents	None	No	Yes
Use of recombinant interferon	None	No	Yes
Use of chloroquine or hydroxychloroquine	None	No	Yes
Use of tocilizumab	None	No	Yes
Use of helmet NIPPV rather than mask NIPPV	None	Yes	No
Endotracheal aspirates suggested over bronchoalveolar lavage, bronchial wash, or sputum induction	Weak	Yes	Yes

ARDS = acute respiratory distress syndrome, NIPPV = noninvasive positive pressure ventilation,  $\text{SpO}_2$  = peripheral oxygen saturation.

In addition to providing the life-saving interventions, the cumulative surge capacity will cause an extraordinarily higher demand for critical care providers to implement infection containment measures. COVID-19 cohort ICUs should be created to minimize the risk of in-hospital transmission. Nonemergent procedures should be canceled to increase ICU bed availability. Patient visitation should be very limited and education on proper infection control measures should be strictly enforced. With the increasing demand for ICU supplies, critical care providers should be aware of their inventory, including personal protective equipment, respirator masks, and oxygen support including mechanical ventilators. Triage areas to rapidly screen, test, and treat potential COVID-19 patients should be established to help allocate them to the proper cohort with the help of readily available infection preventionists. Cleaning and waste disposal should be focused on

avoiding the generation or reaerosolization of infectious material. Institutional algorithms should be implemented and frequently updated to help providers maintain an appropriate triage, assessment, admission, infection control, and disposition.

In summary, the most current SSC recommendations generally represent recommendations for the treatment of septic shock and ARDS from any infectious etiology and are not overly specific to COVID-19 patients. Given the volatile state of our current guidance, changes in recommendations is near certain. Guidelines, including those by the SSC, WHO, and Center for Disease Control and Prevention, must be updated regularly to help universally optimize sepsis care due to COVID-19 and help flatten the briskly rising morbidity and mortality curve.

Dr. Rimawi has disclosed that he does not have any potential conflicts of interest.

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