Surviving Sepsis Campaign®

Surviving Sepsis Campaign Guidelines on the Management of Adults with Coronavirus Disease 2019 (COVID-19) in the ICU

Recommendation Chart: Include First Updates

Category	Definition
Severe	Clinical signs of pneumonia (fever, cough, dyspnea, fast breathing) and one of the following: • Respiratory rate > 30 breaths/minute; • Severe respiratory distress; or • SpO_2 < 90% on room air
Critical	Presence of ARDS or respiratory failure requiring ventilation, sepsis or septic shock

SpO_2 = oxygen saturation

RECOMMENDATION	STRENGTH
Infection Control and Testing	
• For healthcare professionals performing **aerosol-generating procedures** on patients with COVID-19 in the ICU, we recommend using fitted respirator masks (N95 respirators, FFP2, or equivalent) as opposed to surgical/medical masks, in addition to other PPE (e.g., gloves, gown, and eye protection, such as a face shield or safety goggles)	**Best practice statement**
• We recommend performing **aerosol-generating procedures** on ICU patients with COVID-19 in a negative-pressure room.	**Best practice statement**
• For COVID-19 patients requiring **endotracheal intubation**, we recommend that endotracheal intubation be performed by the healthcare professional who is most experienced with airway management to minimize the number of attempts and risk of transmission.	**Best practice statement**
• For healthcare professionals providing usual care for **nonventilated COVID-19 patients**, we suggest using surgical/medical masks as opposed to respirator masks, in addition to other PPE (e.g., gloves, gown, and eye protection, such as a face shield or safety goggles)	**Weak**

• For healthcare professionals performing **non-aerosol-generating procedures on mechanically ventilated (closed circuit) patients** with COVID-19, we suggest using surgical/medical masks as opposed to respirator masks, in addition to other PPE (e.g., gloves, gown, and eye protection, such as a face shield or safety goggles).	**Weak**
• For healthcare professionals performing **endotracheal intubation on patients with COVID-19**, we suggest using video-guided laryngoscopy over direct laryngoscopy, if available.	**Weak**
• For intubated and mechanically ventilated adults with suspicion of COVID-19: For **diagnostic testing**, we suggest obtaining lower respiratory tract samples in preference to upper respiratory tract (nasopharyngeal or oropharyngeal) samples.	**Weak**
• For intubated and mechanically ventilated adults with suspicion of COVID-19: With regard to **lower respiratory samples**, we suggest obtaining endotracheal aspirates in preference to bronchial wash or bronchoalveolar lavage samples.	**Weak**
HEMODYNAMICS	
• For adults with COVID-19 and shock, we recommend against using dopamine if norepinephrine is available.	**Strong**
• For the acute resuscitation of adults with COVID-19 and shock, we recommend against using hydroxyethyl starches.	**Strong**
• In adults with COVID-19 and shock, we suggest using dynamic parameters of skin temperature, capillary refill time, and/or serum lactate measurement over static parameters to assess fluid responsiveness.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we suggest using a conservative over a liberal fluid strategy.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we recommend using crystalloids over colloids.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we suggest using buffered/balanced crystalloids over unbalanced crystalloids.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we suggest against using gelatins.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we suggest against using dextrans.	**Weak**
• For the acute resuscitation of adults with COVID-19 and shock, we suggest against the routine use of albumin for initial resuscitation.	**Weak**
• For adults with COVID-19 and shock, we suggest using norepinephrine as the first-line vasoactive agent over other agents.	**Weak**
• For adults with COVID-19 and shock, if norepinephrine is not available, we suggest using either vasopressin or epinephrine as the first-line vasoactive agent over other vasoactive agents.	**Weak**

• For adults with COVID-19 and shock, we suggest adding vasopressin as a second-line agent over titrating norepinephrine dose, if target MAP cannot be achieved by norepinephrine alone.	**Weak**
• For adults with COVID-19 and shock, we suggest titrating vasoactive agents to target a MAP of 60-65 mm Hg rather than higher MAP targets.	**Weak**
• For adults with COVID-19 and shock with evidence of cardiac dysfunction and persistent hypoperfusion despite fluid resuscitation and norepinephrine, we suggest adding dobutamine over increasing norepinephrine dose.	**Weak**
VENTILATION	
• In adults with COVID-19, we suggest starting supplemental oxygen if the peripheral SpO_2 is < 92%, and recommend starting supplemental oxygen if SpO_2 is < 90%.	**Strong**
• In adults with COVID-19 and acute hypoxemic respiratory failure on oxygen, we recommend that SpO_2 be maintained no higher than 96%.	**Strong**
• If recruitment maneuvers are used, we recommend against using staircase (incremental PEEP) recruitment maneuvers.	**Strong**
• In mechanically ventilated adults with COVID-19 and ARDS, we recommend using low Vt ventilation (Vt 4-8 mL/kg of predicted body weight) over higher tidal volumes (Vt > 8 mL/kg).	**Strong**
• For mechanically ventilated adults with COVID-19 and ARDS, we recommend targeting Pplat of < 30 cm H_2O.	**Strong**
• For mechanically ventilated adults with COVID-19 and moderate to severe ARDS, we suggest using a higher PEEP strategy over a lower PEEP strategy. *Remark:* If using a higher PEEP strategy (i.e., PEEP > 10 cm H_2O), clinicians should monitor patients for barotrauma.	**Strong**
• In adults with COVID-19 receiving NIPPV or HFNC, we recommend close monitoring for worsening of respiratory status and early intubation in a controlled setting if worsening occurs.	**Best practice statement**
• For adults with COVID-19 and acute hypoxemic respiratory failure despite conventional oxygen therapy, we suggest using HFNC over conventional oxygen therapy.	**Weak**
• In adults with COVID-19 and acute hypoxemic respiratory failure, we suggest using HFNC over NIPPV.	**Weak**
• In adults with COVID-19 and acute hypoxemic respiratory failure, if HFNC is not available and there is no urgent indication for endotracheal intubation, we suggest a trial of NIPPV with close monitoring and short-interval assessment for worsening of respiratory failure.	**Weak**

• For mechanically ventilated adults with COVID-19 and ARDS, we suggest using a conservative fluid strategy over a liberal fluid strategy.	**Weak**
• For mechanically ventilated adults with COVID-19 and moderate to severe ARDS, we suggest prone ventilation for 12 to 16 hours over no prone ventilation.	**Weak**
• For mechanically ventilated adults with COVID-19 and moderate to severe ARDS: We suggest using as-needed intermittent boluses of NMBAs over continuous NMBA infusion to facilitate protective lung ventilation.	**Weak**
• In the event of persistent ventilator dyssynchrony or the need for ongoing deep sedation, prone ventilation, or persistently high plateau pressures, we suggest using a continuous NMBA infusion for up to 48 hours.	**Weak**
• In mechanically ventilated adults with COVID-19 ARDS, we recommend against the routine use of inhaled nitric oxide.	**Weak**
• In mechanically ventilated adults with COVID-19, severe ARDS, and hypoxemia despite optimizing ventilation and other rescue strategies, we suggest a trial of inhaled pulmonary vasodilator as a rescue therapy. If no rapid improvement in oxygenation is observed, the treatment should be tapered off.	**Weak**
• For mechanically ventilated adults with COVID-19 and hypoxemia despite optimizing ventilation, we suggest using recruitment maneuvers over not using recruitment maneuvers.	**Weak**
• In mechanically ventilated adults with COVID-19 and refractory hypoxemia despite optimizing ventilation, use of rescue therapies, and proning, we suggest using VV ECMO, if available, or referring the patient to an ECMO center. *Remark*: Because of the resource-intensive nature of ECMO and the need for experienced centers, healthcare professionals, and infrastructure, ECMO should be considered only for carefully selected patients with COVID-19 and severe ARDS.	**Weak**
• We were not able to make a recommendation regarding the use of helmet NIPPV compared with mask NIPPV. It is an option, but we are not certain about its safety or efficacy in COVID-19.	**No recommendation**
• There is insufficient evidence to issue a recommendation on the use of awake prone positioning in nonintubated adults with severe COVID-19.	**No recommendation** New

THERAPY	
• For adults with severe or critical COVID-19, we recommend against using hydroxychloroquine.	**Strong** New
• For adults with severe or critical COVID-19, we recommend using a short course of systemic corticosteroids over not using corticosteroids.	**Strong** New
• For adults with severe or critical COVID-19, we recommend using pharmacologic VTE prophylaxis over not using prophylaxis.	**Strong** New
• For adults with severe or critical COVID-19 who are considered for systemic corticosteroids, we suggest using dexamethasone over other corticosteroids. *Remark*: If dexamethasone is not available, clinicians may use other corticosteroids in doses equivalent to 6 mg daily of dexamethasone for up to 10 days.	**Weak** New
• For adults with severe COVID-19 who do not require mechanical ventilation, we suggest using IV remdesivir over not using it. *Remark*: Remdesivir should *ideally* be started within 72 hours of positive SARS-CoV-2 polymerase chain reaction or antigen testing.	**Weak** New
• For adults undergoing mechanical ventilation for critical COVID-19, we suggest against starting IV remdesivir.	**Weak** New
• For critically ill adults with COVID-19 who develop fever, we suggest using acetaminophen/paracetamol for temperature control over no treatment.	**Weak**
• In critically ill adults with COVID-19, we suggest against the routine use of standard IV IVIG.	**Weak**
• For adults with severe or critical COVID-19, we suggest against the use convalescent plasma outside clinical trials.	**Weak** New
• There is insufficient evidence to issue a recommendation on the routine use of therapeutic anticoagulation (compared to VTE prophylaxis) for adults with severe or critical COVID-19 and no confirmed VTE.	**No recommendation** New

PPE=personal protective equipment, MAP=mean arterial pressure, SpO_2=oxygen saturation, HFNC=high-flow nasal canula, NIPPV=noninvasive positive pressure ventilation, ARDS=acute respiratory distress syndrome, Vt=tidal volume, Pplat=plateau pressure, PEEP=positive end-expiratory pressure, NMBA=neuromuscular blocking agent, VV=venovenous, ECMO=extracorporeal membrane oxygenation, IVIG=immunoglobulin.