

PHILIPS

V60 Plus
Ventilator

V60 PLUS COVID-19 WHITE PAPER

Designed to support fast intervention in respiratory patient care, the Philips V60 Plus enables clinicians to quickly and smoothly switch between High Flow Therapy (HFT), non-invasive ventilation (NIV), and invasive mechanical ventilation, using the same circuit.

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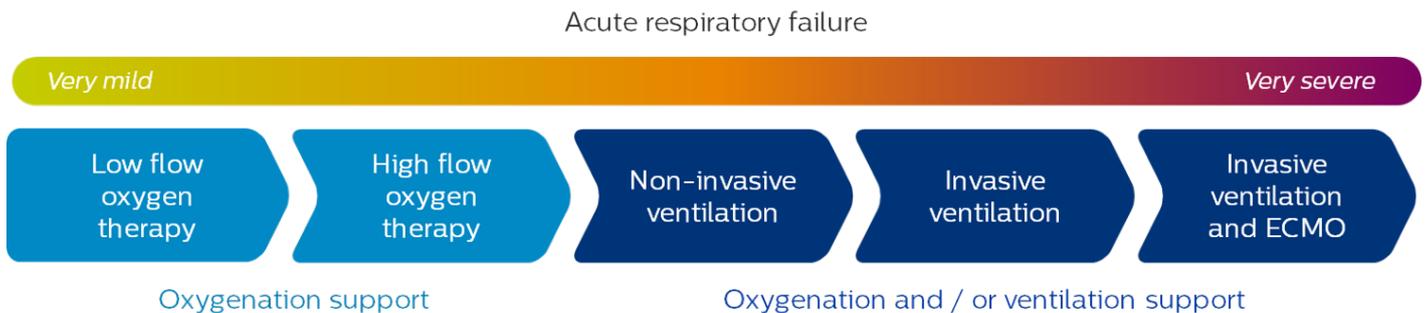


Figure 1.

Supporting patients with respiratory devices during an acute or sudden compromised respiratory state is critical to successful patient outcomes. As a leading health technology provider, Philips understands the clinician's need to provide the appropriate respiratory solution across the continuum of acute respiratory failure (**Figure 1**).

Applying respiratory support for gas exchange 'buys time' while clinicians treat and patient healing reverses the underlying cause. At the same time, clinicians are attentive to minimizing the potential injurious effects of intervention, such as ventilator-induced lung injury, particularly associated with more invasive interventions¹.

In light of the growing threat on the respiratory system brought about by the COVID-19 virus, Philips is committed to providing solutions that will help clinicians care for the critically ill. In this paper Philips will:

- Describe the pathophysiology and presentation of the COVID-19 syndrome

- Present guidelines and clinical observations for respiratory management of COVID-19 acute respiratory distress syndrome (ARDS)
- Review the Philips solutions for mechanical ventilatory support with a focus on the V60 Plus ventilator

Pathophysiology and presentation

COVID-19 is the name of the syndrome (collection of symptoms and signs) attributable to infection by the **SARS-COV-2 virus**. The SARS-COV-2 virus is a single strand of mRNA surrounded by a lipid envelope. Spike proteins on the surface mark its membership in the family of Corona viruses, giving it a crown-like appearance when imaged.

The virus infects individuals by entering the airway and descending to the alveoli. Some patients exposed to SARS-COV-2 develop a viral pneumonia, which can progress to **Acute Respiratory Distress**

Syndrome (ARDS). The spike protein of the SARS-COV-2 virus attaches to the angiotensin-converting enzyme 2 (ACE2) receptor located on type II alveolar cells.^{2,3} Replication of the virus leads to pneumocyte death. Diffuse alveolar damage including the development of hyaline membranes follows.⁴ Loss of surfactant, together with flooding of alveoli, leads to alveolar de-recruitment and ventilation-perfusion abnormality. In some patients the local inflammation is associated with a system inflammatory response syndrome (SIRS). When the systemic inflammation evolves to a dysregulated response, the ensuing “cytokine storm syndrome” may emulate severe sepsis, septic shock, and proceed to multiple organ failure and death.

The presentation of COVID-19 includes the following symptoms and signs:^{5,6}

Symptoms (what the patient senses)

- Cough
- Dyspnea (shortness of breath)
- Confusion
- Loss of smell and/or taste
- Diarrhea, nausea

Signs (what the clinician observes)

- Fever
- Hypoxemia
- Lymphopenia (low lymphocytes)
- Elevated Lactate Dehydrogenase (LDH)
- Diffuse, bilateral, ground glass infiltrates on chest radiology (CXR) and Computerized Tomography (CT)

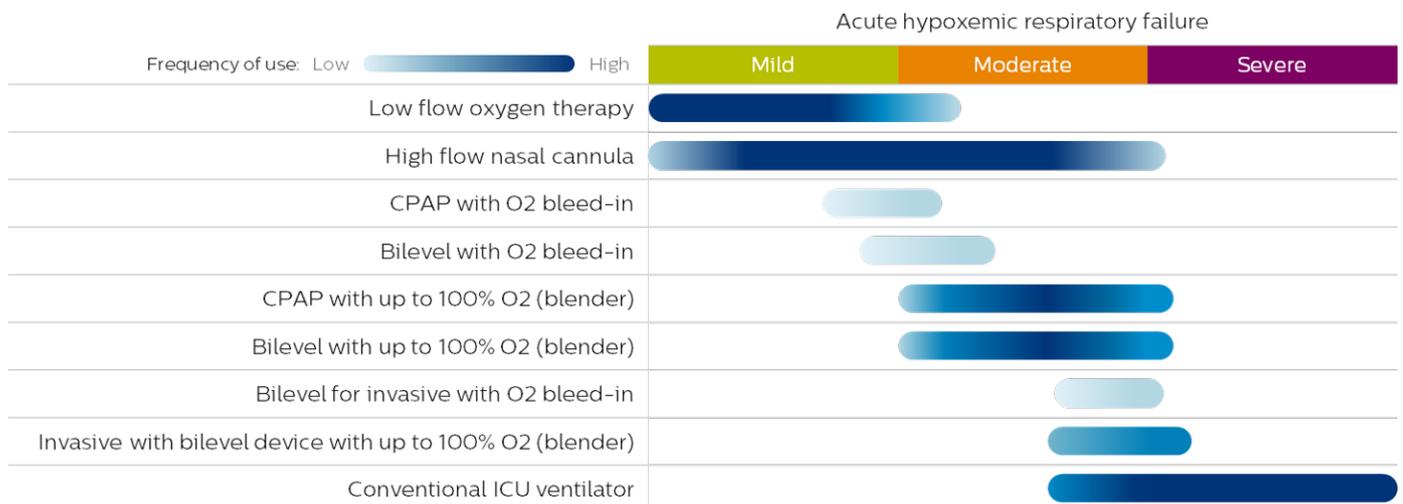
Guidelines and clinical observations of respiratory management in COVID-19

Several organizations have published guidelines related to the respiratory management of COVID-19 patients.^{7,8,9,10,11} Listed in these guidelines is the potential role in which high flow therapy, non-invasive and invasive ventilation play in the management of COVID-19 patients. The use of high-flow therapy is suggested for patients with various degrees of acute hypoxemic respiratory failure in COVID-19 patients. The use of non-invasive positive pressure ventilation such as CPAP and BIPAP is suggested for patients with varying degrees of acute hypoxemic respiratory failure. Invasive mechanical ventilation following the ARDSnet guidelines is recommended for patients with moderate to severe acute hypoxemic respiratory failure in COVID-19 patients.

For the treatment of acute respiratory failure, data suggests that there is a benefit to using high flow therapy in a fashion that is complementary to non-invasive ventilation¹¹. Clinicians have reported escalating patients who fail high flow therapy to non-invasive ventilation to prevent further deterioration and escalation to invasive mechanical ventilation. Close monitoring and timely escalation are important in assuring optimal outcomes. Similarly, de-escalation from invasive mechanical ventilation to non-invasive ventilation or high flow therapy, or a combination of the two, can help to avoid post-extubation respiratory failure.¹²

The respiratory management of COVID-19 patients who develop ARDS has been clinically observed (**Figure 2**). Depending upon the severity of respiratory failure, patients may receive oxygen therapy, non-invasive positive pressure ventilation, and/or invasive mechanical ventilation.

Figure 2: Observed respiratory management for COVID-19 patient who develop ARDS



V60 Plus

When there is a need for multiple therapies to treat a patient, a problem can arise as multiple devices are required while escalating or de-escalating therapy. Clinicians may have to temporarily leave the patient bedside to locate a second device adding to the risk of cross-contamination and increasing demand for additional personal protective equipment (PPE). Additionally, multiple devices in a patient's room presents challenges with space limitation. There also exists the need to clean and disinfect multiple devices as well as ensuring that the appropriate delivery tube is available.

The V60 Plus is designed to help clinicians treat various forms of acute respiratory failure. It is capable of delivering high flow oxygen therapy (HFT), non-invasive ventilation (NIV), and invasive mechanical ventilation, using the same heated wire circuit. This helps minimize the need to leave the patient's room in cases when escalating or de-escalating to an alternative form of respiratory management is required, enabling clinicians to quickly switch modes and minimize delays. An additional benefit afforded to the clinician with the inclusion of HFT is the ability to train on a ventilator's familiar user-interface, allowing clinicians to focus on managing their patients rather than focusing on learning a new, unfamiliar equipment.

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