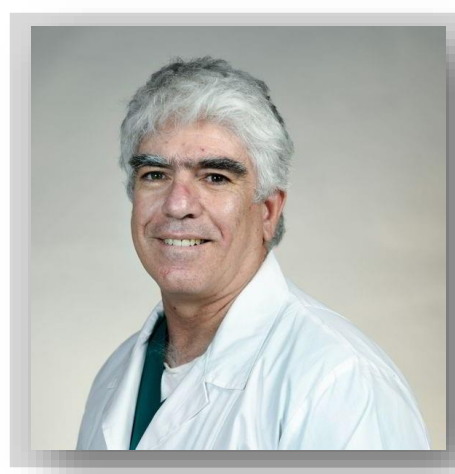


# Low Flow Extracorporeal Oxygenation Approach is the Future of Acute Respiratory Care



Dr. Avraham Abutbul MD., Specialist in Internal Medicine, General Intensive Care Medicine and Pulmonary Medicine\*

Mechanical ventilation has many disadvantages for both patients and clinicians. The COVID-19 underlined the limits of this veteran technology which developed in the last century. As a result, the COVID has become a growth engine for bringing innovative respiratory technologies to the market and as soon as possible.

Mechanical ventilation can cause severe damage. Thus, for us, the clinicians, the decision to connect a patient to this treatment is a tough choice.

Humans' respiratory system normally works under negative pressure. It means that the pressure within the pleural cavity is slightly less than the atmospheric pressure, which means the normal respiratory system is a negative pressure ventilation. When we mechanically ventilate a patient, the pressure is maintained to deliver tidal volume to the lungs, the positive pressure thus reducing the shunting of blood through the lungs and improving gas exchange. The positive pressure ventilation can damage the lungs in few mechanisms including Volutrouma, Barotrauma and Atelectotrouma. In addition, very high levels of oxygen may be harmful to the lungs as well. Doctors only give as much oxygen as it takes to ensure the body is getting enough oxygen supply to the vital organs. Sometimes it is hard to reduce this risk when the lungs are already damaged.

In refractory hypoxia after maximal non-invasive measures exhausted, the medical community today has no other measures to keep refractory hypoxic patients alive except for mechanical ventilation and it is usually a decision out of no other choice. The damage is prolonged hospitalization and the consequences of intubation and induced coma. Removing the tubes from the patient during the weaning process is fraught with suffering as well as other complications. The COVID-19 patients that we had to ventilate were hospitalized for long periods usually more the 6 weeks, while other patients that were treated with non-invasive ventilators were hospitalized for an average of ten days.

Among the Common complications of mechanical ventilation are infections that lead to ventilator-associated pneumonia. Mechanically ventilated patients require many invasive procedures in addition to intubation, such as Central Line that is used to administer medications or fluids. Every tube that enters the body can be an entrance point for infectious penetration.

The medical community is looking today for new treatments and technologies for patients with acute respiratory failure. During the COVID-19 pandemic, we all find the Extracorporeal Membrane Oxygenation Technology very useful because it bypasses the lungs. The patient gets the right amount of oxygen he needs without putting pressure on the sick lung and allowing "lung rest". The problem is that it is costly and complicated to administer because it requires one-on-one nurse to

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patient attention, a cardiothoracic surgeon specialist, and a perfusionist to operate the ECMO machine. Another high risk lies in the volume of blood that is circulated in high flows at any given point. It runs around 5-6 liters per minute –which is the entire amount of blood in the body. The smallest leak from the system might cause the patient's death within seconds.

Due to these limitations, and shortage of resources we, the clinicians forced to connect only the most needed patient to ECMO usually when they already has 80% chance of mortality. I believe that if we had a technology or treatment that enabled direct blood oxygenation easy to administer and at a reasonable cost, we would not hesitate to offer it to our patients at an early stage.

This is where the opportunities for Inspira's technology, the INSPIRA ART come in. The ideal opportunity is for the INSPIRA ART as a preventive treatment. A new SOC for treating patients with acute respiratory failure instead of mechanical ventilation. This intent of use will change the treatment paradigm and will save the use of sedatives that can be harmful with long effects after treatment.

The second opportunity is to combine mechanical ventilation with the INSPIRA ART. Since the minimum pressure of a mechanical ventilator is the least damage you get, if we use the INSPIRA ART with mechanical ventilation, we will lower the pressure on the lungs and minimize the risk of lung damage.

The third option is to combine the INSPIRA ART with non-invasive ventilators in order to stop patient's deteriorating. Preventive treatment is the best treatment, and that is why the possibility of preventing mechanical ventilation is so important.

Since potentially the patient can be awake during treatment, and only one small cannula will be used, the hospital will be able to reduce LOS, which will lead to lowering staffing – perfusionists and surgical access team.

As critical care clinicians, we strive to offer optimal care for every patient. We cringe for an innovative and economic technology that will enter as a support system in the oxygenating arena. Extracorporeal oxygenating technologies are much more effective for refractory hypoxemic patients.

Covid-19 pandemic underlined the limits of MV. Since ECMO is a limited resource with high demand, the INSPIRA ART, Inspira's novel technology based on extracorporeal sub-dynamic-low flow approach technology, is a definitive answer for these demands.

\*Dr. Abutbul is a member of Inspira's Medical Advisory Board