

COVID-19 protocol for non-invasive ventilation using the GO2Vent®

Ecuador in Crisis & medical care Innovation: Dr H Espejo, Hospital IESS Quito Sur

The Republic of Ecuador is a small country located in northwestern South America. Quito is the capital of this bustling developing nation with strong roots in the natural resources found within its borders. Like many countries around the world, Ecuador was hit hard by COVID-19 and found its medical care system struggling in the face of the pandemic. Mechanical ventilators were not available in sufficient numbers to manage the surge of COVID patients and the death rate rose quickly.

Faced with this rising tide of critically ill patients in respiratory distress the medical critical care team at the Hospital IESS Quito Sur searched for methods to save lives. Hospital IESS Quito Sur is a 450-bed tertiary care and referral hospital offering 47 different medical specialties and a full scope emergency medical care department. Dr Hugo Espejo, Deputy Director of Critical Care Medicine, turned to the Vortran Medical GO2Vent® as a potential life-saving tool. Being aware that the survival rate of intubated patients with COVID was documented as being very low he looked to use the pneumatic automatic resuscitator/ventilator in a non-invasive role. Historically, the GO2Vent® had not been used in a non-invasive role so there was no protocols or published information to utilize. Very quickly Dr Espejo and his team began using a full, non-vented face mask and the GO2Vent® to deliver non-invasive support to patients in COVID respiratory distress. Through their successes and challenges, they refined their knowledge base and created a protocol to identify COVID patients and direct them to the appropriate available therapies—conventional intubation & mechanical ventilation, non-invasive support using the GO2vent®, conventional oxygen high flow therapies or supplemental oxygen therapies. Proning played an extremely important role in many of these therapies and is based on current COVID recommendations.

The protocol utilizes initial physical examination, oxygen saturation/oxygen requirements (Utilized in **ROX** scoring) and arterial blood gases to direct the patient into a treatment limb. Using the **HACOR** scoring and P/F ratio the patient's placement in the protocol were further refined.

Requirements

Use of the **ROX index** at triage^{1,2} - measurement of SpO₂, FiO₂ and respiratory rate

$$\frac{\text{SpO}_2/\text{FiO}_2}{\text{respiratory rate}} = \text{ROX index}$$

- recommendation for scoring is at triage, 2 hours, 6 hours and at the 12 hour marks;
- increasing scores indicates success, declining scores or **score <4** indicates failure and need for intubation.

Use of HACOR score, once Arterial Blood Gases (ABG) are available, as indication of therapy failure (NIPPV).

A possible total of 25 points is available. The higher the score, the higher the likelihood of failure of therapy. An arterial blood gas is required to use this scoring system so initial score is established at the time of the ABG. At 1 hour, a **score of 5 or more is indicative of probable failure**. In addition, an increasing score is also indicative of the need to re-assess therapy to prevent NIPPV failure.

¹ Utility of the respiratory rate-oxygenation (ROX) index in predicting respiratory failure requiring mechanical ventilation in acute care medicine. Casey Cable, Markos Kashiouris, Angelique Gross, Benjamin Wiese Chest Annual Meeting, Oct 18-21 2020, <http://dx.doi.org?10.1016/j.chest.2020.08.544>

² An index combining respiratory rate and oxygenation to predict outcome of nasal high-flow therapy.

Oriol Roca, Berta Caralt, Jonathan Messika, Manuel Samper, Benjamin Sztrymf, et al. Am.Journal of Respiratory and critical care Medicine. Vol 199, Issue 11. Dec 20,2018

HACOR Score

VARIABLES	CATEGORY	POINTS
Heart rate (BPM)	<=120	0
	>=120	1
pH (ABG)	>=7.35	0
	7.30-7.34	2
	7.25-7.29	3
	<7.25	4
Glasgow Coma Scale (GCS)	15	0
	13-14	2
	11-12	5
	<=10	10
PaO ₂ /FiO ₂	>=201	0
	176-200	2
	151-175	3
	126-150	4
	101-125	5
	<=100	6
Respiratory rate Breaths/minute	<=30	0
	31-35	1
	36-40	2
	41-45	3
	>=46	4

Respiratory Failure

Type 1 – hypoxemic with normal PaCO₂, PaO₂ <50 mmHg on AIR

Type 2 – hypercapnic (PaCO₂ >50 mm Hg)

RASS Scoring

Ideally score to be kept at 0 to -1

Score	Classification
+4	Combative
+3	Very agitated
+2	Agitated
+1	Restless
0	Alert and calm
-1	Drowsy
-2	Light sedation
-3	Moderate sedation
-4	Deep sedation
-5	Unarousable sedation