

Himmelfarb Health Sciences Library, The George Washington University

Health Sciences Research Commons

Intelligence Unit Research Briefs

GW Covid-19 Collection

6-11-2020

Use and Efficacy of Nitric Oxide for Treatment of Covid-19 Patients

George Washington University

Follow this and additional works at: <https://hsrc.himmelfarb.gwu.edu/intelligenceunitresearchbriefs>

Use and Efficacy of Nitric Oxide for treatment of Covid-19 patients

Date: June 11, 2020

Contributors: Lawrence Deyton, Laura Abate

Summary: There are several established scientific rationales that support use of inhaled Nitric oxide (NO) in the treatment of Covid-19 respiratory disease or perhaps in prevention of Covid-19 infection. With appropriate administration, use of inhaled NO appears to be safe. Multiple trials are underway to examine the clinical efficacy of inhaled NO at several stages of Covid-19 disease as well as one using inhaled NO as prophylaxis for health care workers exposed to Covid-19 patients. Other than several case reports, we could find no efficacy data yet on the use of NO in patients with Covid-19 disease. Use of NO should be done in the context of a clinical trial.

Key points:

Nitric oxide (NO) inhalation therapy has potential therapeutic application for treatment of patients with Covid-19 disease or at risk of Covid-19 infection. It is known that:

- NO has potent and selective pulmonary vasodilation effects.
- Inhaled NO can lower pulmonary vascular resistance.
- NO is known to decrease edema in the alveolar spaces which enhances ventilation/perfusion matching.
- There is some evidence that inhaled NO can reduce inflammatory cell-mediated lung injury by inhibiting neutrophil activation and subsequent pro-inflammatory cytokine release.
- There is also some evidence in that NO may have some antiviral effects.

In 2004, during the severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak, a pilot study showed that lowdose inhaled NO could shorten the time of ventilatory support for patients infected with SARSCoV. Similar therapeutic effects of NO might be expected for patients with COVID-19 due to the genetic similarities between the two viruses.

Based on these experiences and hypotheses, clinical trials have begun in the United States, Italy and China:

- A phase 2 clinical trial of inhaled NO is being conducted for mechanically ventilated patients with COVID-19 ARDS
- Five trials are underway or planned at Massachusetts General Hospital:
 - NO treatment for severely ill patients who are already on ventilators with an endpoint of decreased time on ventilator and improve survival.
 - For patients with mild-to-moderate COVID-19 to see if inhaling NO can prevent progression of the disease and keep the patient off a ventilator.
 - An international registry of ICU COVID-19 patients on ventilators, to help consolidate worldwide data on use of NO.

- In planning, a study on whether giving nitric oxide to COVID-19 patients in the ER can stop their disease from getting worse, and keep patients out of the hospital.
- In planning, a study which will examine whether giving nitric oxide to health care workers who aren't sick, might prevent them from getting COVID-19.
- A randomized controlled trial testing inhaled NO in mechanically ventilated patients with Covid-19 has begun in multiple centers in China, Italy and the US.

On March 20, 2020, FDA granted emergency expanded access allowing an NO delivery system (INOpulse®) to be used for the treatment of COVID-19.

References:

An Update on Current Therapeutic Drugs Treating COVID-19, Lancet. May 11, 2020
<https://link.springer.com/article/10.1007/s40495-020-00216-7>

Nitric oxide inhalation as an interventional rescue therapy for COVID-19-induced acute respiratory distress syndrome. Annals of Intensive Care (2020) 10:61, May 20, 2020
<https://doi.org/10.1186/s13613-020-00681-9>

Treatment for severe acute respiratory distress syndrome from COVID-19, Lancet Respiratory Medicine. Published Online March 20, 2020
[https://www.thelancet.com/journals/lanres/article/PIIS2213-2600\(20\)30127-2/fulltext](https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30127-2/fulltext)

Potential Immunoregulatory and Antiviral/SARS-CoV-2 Activities of Nitric Oxide. Science Monitor. Published Online May 18, 2020
<https://www.medscimonit.com/abstract/index/idArt/925679>

Protocol of a randomized controlled trial testing inhaled Nitric Oxide in mechanically ventilated patients with severe acute respiratory syndrome in COVID-19 (SARS-CoV-2) Available Online via MedRviV May 24, 2020.
<https://doi.org/10.1101/2020.03.09.20033530>

Evidence mounts supporting inhaled nitric oxide as COVID-19 treatment, May 20, 2020.
<https://www.healio.com/news/primary-care/20200520/evidence-mounts-supporting-inhaled-nitric-oxide-as-covid19-treatment>