

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/342106286>

# Indicative Protocol for a First Level Oxygen Therapy Centre for Patients with Suspected or Confirmed COVID-19

Preprint · June 2020

CITATIONS

0

READS

368

2 authors:



**Amita Sudhir**

University of Virginia

11 PUBLICATIONS 18 CITATIONS

SEE PROFILE



**Nachiket Mor**

Johns Hopkins University

48 PUBLICATIONS 92 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Primary Care [View project](#)



Medical Education in Developing Countries [View project](#)

# Indicative Protocol for a First Level Oxygen Therapy Centre for Patients with Suspected or Confirmed COVID-19

developed by

Dr Amita Sudhir, MD & Nachiket Mor, PhD<sup>1</sup>

## Preamble

Patients with COVID-19 have a risk of experiencing rapid decompensation and should ideally be treated in centres which have the on-site ability to offer advanced oxygen therapy to them. However, most patients, even those that are severely ill, recover with basic oxygen therapy, and careful monitoring of their condition will, in most cases, allow sufficient time for them to be transported to the advanced therapy centres if their condition does not respond to the first-level oxygen therapy being offered here<sup>2</sup>. Patients need to be made fully aware of the risks associated with being treated in such a centre, and their signed consent should be sought prior to admission.

## Infrastructure

1. One oxygen concentrator per bed with 5 litres per minute capacity.
2. One pulse-oximeter per bed.
3. One blood-pressure monitor per facility.
4. Well ventilated hall / room with several openable windows allowing a free-flow of breeze.
5. At least one full-time healthcare worker per 5 beds so that the healthcare worker is able to competently operate the oxygenator; observe and record the readings on the pulse-oximeter with high fidelity; and observe and record other signs and symptoms of the patients under the healthcare worker's care.

## Admission Criteria

1. With Chronic Hypoxia  $S_pO_2 < 88\%$ : If the patient has known hypoxia at baseline, the  $S_pO_2$  levels qualifying for admission can be as low as 88%.
2. Without Chronic Hypoxia  $S_pO_2 < 94\%$ : If the patient has no self-reported respiratory ailments like COPD (Chronic Obstructive Pulmonary Disorder) that cause chronic hypoxia, then patients with  $S_pO_2$  levels less than 94% will benefit from supportive therapy.
3. Non-Pregnant Women: Women who are pregnant cannot be admitted to such a centre and need to be referred for advanced care immediately.
4. Minimum Age > 16 years: Children under age 16 who are hypoxic need to be referred for advanced care immediately.
5. All patients to be presumed to be COVID positive at the time of admission.

---

<sup>1</sup> This indicative protocol has been developed by Dr Amita Sudhir, MD (as2cd@virginia.edu), Residency Program Director and Associate Professor of Emergency Medicine, Department of Emergency Medicine, University of Virginia School of Medicine (Charlottesville, USA) and Nachiket Mor, PhD, Visiting Scientist, The Banyan Academy of Leadership in Mental Health, in consultation with Dr Dhruv Joshi (dhruv.joshi@cloudphysician.net), Pulmonologist & Critical Care Specialist, Cloudphysician (Bengaluru, India); and Dr Shruti Tandan (shrutitandan@gmail.com), Critical Care Specialist, Jaslok Hospital (Mumbai, India). The doctors have used a combination of their clinical experience, training, and available research, to guide the development of this protocol. **However, any facility that chooses to use this indicative protocol will need to have its own clinicians and experts carefully review it, make any modifications that they deem necessary, and formally approve it, before it is implemented.**

<sup>2</sup> See Dondorp et al, 2020 for a comprehensive review on "Respiratory Support in COVID-19 Patients, with a Focus on Resource-Limited Settings".

## Oxygen Therapy

1. Audible Wheeze: If audible wheeze present, give 4 puffs of Duolin using an MDI (Metered Dose Inhaler) with Spacer. If Duolin not available, can use Levolin or Asthalin. The dose can be repeated every 30 minutes up to 3 doses until wheezing or hypoxia improves. Once improvement is noted, 2 puffs can be given up to every hour as needed for continued wheezing. To reduce risk of aerosolization, no nebulized medications should be given.
2. Nasal Oxygen: Start Patient on Nasal Oxygen at 2 litres per minute. Observe oxygenation level in 15-minute intervals. Gradually increase oxygen to achieve desired SpO<sub>2</sub>, to a maximum 5 litres per minute.
3. With Chronic Hypoxia: Patients with COPD (or other conditions that cause chronic hypoxia) should not be placed on a nonrebreather mask or corrected above 92%.
4. Positioning: The patient can be seated or in supine position while oxygen is being administered. However, if administering oxygen by nasal cannula is not helping, persuade patients to lie on their stomach or on their sides.
5. Referral: If SpO<sub>2</sub> level is not increasing after two hours of therapy, or falls below 80% then refer for more advanced oxygen therapy.
6. Expert Consultation: If the patient remains in the centre for longer than 48 hours, consultation with an expert should be sought in-person or via telemedicine.
7. Discharge: Once patient has been stable on a certain oxygen level for 2 hours, may attempt to wean oxygen down by 0.5 litres per minute increments every 2 hours. Once levels reach zero the oxygen supply can be removed. Patient can be discharged after an additional two hours of observation to ensure that the patient remains stable (refer Discharge Criteria).

## Discharge Criteria

1. With Chronic Hypoxia: If the patient has COPD or self-reported respiratory ailments causing low SpO<sub>2</sub> levels then: (a) cease escalation of oxygen therapy for patients when SpO<sub>2</sub> levels become greater than 92% (b) observe and record SpO<sub>2</sub> levels at 15 minute intervals for the next two hours without oxygen support; (c) discharge to home-isolation if SpO<sub>2</sub> levels maintained above 88% over that period.
2. Without Chronic Hypoxia: If the patient has no self-reported chronic respiratory ailments such as COPD (Chronic Obstructive Pulmonary Disorder) causing chronic hypoxia then: (a) cease escalation of oxygen therapy for patients when SpO<sub>2</sub> levels become greater than 94%; (b) observe SpO<sub>2</sub> levels at 15 minute intervals for the next two hours without oxygen support; (c) discharge to home-isolation if SpO<sub>2</sub> levels maintained above 94% over that period.
3. All patients have to be presumed to be COVID-19 positive at the time of discharge and advised to isolate at home for 14 days.

## Referral Criteria

1. No Improvement: If oxygenation level is unchanged after two hours of therapy or falls below 80% then refer for more advanced oxygen therapy.
2. Other Symptoms: If the patient reports any other symptoms consistent with an advanced COVID-19 infection such as a severe shortness of breath at rest; difficulty breathing despite correction of hypoxia; pain or pressure in the chest; heavy weight on their chest; cold, clammy, or pale and mottled skin; signs of new confusion; becoming difficult to arouse; blue lips or face; little or no urine output; coughing up blood; neck stiffness; and non-blanching rash (i.e., a rash that does not fade under pressure); persistent heart rate over 100 despite correcting hypoxia and fever; low blood pressure, i.e., Mean Arterial Pressure (MAP)<sup>3</sup> below 65, or Systolic Pressure below 90 mm Hg.
3. Rapid decompensation Risk: there is a risk of the patient having a rapid decline in S<sub>p</sub>O<sub>2</sub> levels if the patient has COVID-19. To avoid this risk once the patient crosses the 80% mark the patient needs to be immediately referred to a more advanced centre.

## Personal Protective Equipment

1. Face Masks: extremely well fitted, single-use, NIOSH certified N-95 masks. Homemade masks will not be satisfactory. All healthcare personnel and caregivers will always need to mandatorily wear this while inside the facility. Patients should wear regular surgical masks if requiring oxygen supplementation, otherwise can wear N-95 masks while being evaluated.
2. Face Shields: well-designed face-shields / eye goggles that completely cover the eyes. All healthcare personnel will always need to mandatorily wear this while inside the facility.
3. Hand-sanitizer: with 70% alcohol and some emollient like glycerine OR soap and water used for at least 20 seconds. Healthcare personnel and caregivers should clean hands before and after each interaction with a patient.
4. Gloves: clinical rubber gloves.
5. Gowns: It is advisable for the healthcare workers to wear a surgical gown or other form of external protective clothing, and to change it between patients.
6. Practice: All healthcare personnel will need to be repeatedly drilled in donning and doffing procedures and found to be 100% compliant, before they are allowed to assist (<https://www.nejm.org/doi/full/10.1056/NEJMvcm2014809>).

---

<sup>3</sup> MAP can be directly measured only by invasive methods but its approximate value can be estimated using a simple blood pressure monitor where, MAP approximately equals the sum of the Diastolic Pressure + (1/3) \* (Systolic Pressure – Diastolic Pressure).

## Prophylaxis and Supportive Care

1. Anticoagulant: If possible, draw blood for a quick Complete Blood Count (CBC). Unless they have a platelet count of less than 50,000; active bleeding or recent bleeding or high risk for bleeding (active Peptic Ulcer Disease); are taking any other blood thinners already (such as Warfarin, Dabigatran, Apixaban, Rivaroxaban); or have a planned surgical procedure in the next 6 to 12 hours; they should be placed on pharmacological agents for Deep Vein Thrombosis (DVT) prophylaxis such as Heparin 5,000 units SQ every twelve hours. If blood draw is not possible, it would be reasonable to continue with prophylaxis if the patient has no signs of easy bruising or bleeding such as petechiae.
2. Antibiotics upon Admission: If the patient is being admitted for hypoxia, start antibiotics as follows and continue for 5 days<sup>4</sup>:
  - a. Amoxicillin-Clavulanate 875 mg orally twice daily (if penicillin allergic, Cefuroxime 500 mg twice daily), and
  - b. Clarithromycin 500 mg twice daily
3. Antibiotics upon Discharge: If the patient does not meet admission criteria but there is clinical suspicion for pneumonia (purulent sputum), or patient is being discharged after admission and antibiotic administration, discharge antibiotics should be prescribed as above to complete the 5 day course.
4. Fluids: Consider IV fluid bolus of up to 1 litre of normal saline as needed for hypotension (low blood pressure, i.e., MAP below 65, or Systolic Pressure below 90 mm Hg) or tachycardia (heart rate in excess of 100 beats per minute) or evidence of dehydration (dry mucous membranes, increased skin turgor, i.e., pinched skin on the back of the hand returning only slowly to its normal flat position). Oral fluids may be used if patient is able to tolerate and an IV cannot be established.

## Risks and Mitigants

1. Over-oxygenation Risk: if the patient has COPD (or other conditions that cause chronic hypoxia) there is a real risk of over-oxygenation. Stop escalating oxygen therapy when  $S_pO_2$  levels reach 100% in all cases.  $SpO_2$  as low as 88% should not necessarily be treated in patients with COPD (or other conditions that cause chronic hypoxia), and they should never be placed on a nonrebreather mask even if it is available, or corrected above 92%.
2. Rapid decompensation Risk: there is a risk of a rapid decline in  $S_pO_2$  levels if the patient has COVID-19. To avoid this risk once the  $S_pO_2$  level drops below the 80% mark, the patient needs to be immediately referred to a more advanced centre.

---

<sup>4</sup> For the management of bacterial pneumonia ([Nayar et al 2019 in Lung India](#))