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Clinical profile and outcome of COVID-19 patients with requirement of oxygen therapy for greater than one week

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Abstract
The novel coronavirus disease (COVID-19) pandemic, caused by the highly contagious severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), is still at its height causing thousands of deaths each week.Although several large randomized drug trials are underway, current survival from severe COVID-19 de- pends entirely on providing the best possible supportive care.1
Data from China suggests that although the majority of people with COVID-19 have mild illness (40%) or moderate illness (40%); about 15 % of them have se- vere illness requiring oxygen therapy, and 5% will be critically ill requiring inten- sive care unit treatment.2, 3 Oxygen therapy is recommended for all moderate, severe and critical COVID-19 patients, with low doses ranging from 1-2 L/min in children and starting at 5 L/min in adults with nasal cannula, moderate flow rates for use with venturi mask (6-10 L/min); or higher flow rates (10-15 L/min) using a mask with reservoir bag. In addition, oxygen can be delivered at higher flow rates and in higher concentrations, using high-flow nasal cannula (HFNC) devices, non-invasive ventilation (NIV) and invasive ventilation devices.4
In this study we would like to identify the risk factors leading to prolonged oxygen requirement in COVID-19 patients.This information will help us in managing our resources effectively in a resource-limited setting by preparing the mindset of the patients early on in the admission for home oxygenation.
The aim of the study is to assess the clinical profile and outcome of COVID-19 patients requiring oxygen therapy for more than one week duration.

Keywords: ICU-Intensive Care Unit, CI-Confidence Interval, HFNO-High Flow Nasal Oxygen, NIV-Non Invasive Ventilation, SARS-Severe Acute Respiratory Syndrome

Introduction
In a study conducted in Lombardy Region,Italy on ICU patients,of the 1591 patients included in the study, the median age was 63 (56-70) years and 1304 (82%) were male. Of the 1043 patients with available data, 709 (68%) had at least 1 comorbidity and 509 (49%) had hypertension. Among 1300 patients with available respiratory support data, 1287 (99% [95% CI, 98%-99%]) needed extended respiratory support, including 1150 (88% [95% CI, 87%-90%]) who received mechanical ventilation and 137 (11% [95% CI, 9%-12%]) who received noninvasive ventilation [5].
In a study done on patients with Middle East respiratory syndrome coronavirus (MERS-CoV), the follow-up chest radiographs were normal in 23 out of 36 (64%) patients. Among the patients with abnormal chest radiographs (36%), the following were found: lung fibrosis in 12 (33%) patients GGO in 2 (5.5%) patients, and pleural thickening in 2 (5.5%) patients and these were the patients needing pro- longed oxygen therapy. Patients with lung fibrosis had significantly greater number of ICU admission days (19 ±8.7 days; *P* value = 0.001), older age (50.6 ±12.6 years; *P* value = 0.02), higher chest radiographic scores [10 (0-15.3); *P* value = 0.04] and higher peak lactate dehydrogenase levels (315-370 U/L; *P* value = 0.001) when compared to patients without lung fibrosis [6].
In a prospective study conducted at Millennium COVID-19 Care Center (MCCC), a makeshift hospital in Addis Ababa, the capital city of Ethiopia,the average dura- tion of supplemental oxygen therapy requirement among COVID-19 patients was 6 days and being 70 years and older and having shortness of breath were found to be associated with prolonged duration of supplemental oxygen therapy requirement [7]
In a study done to evaluate the effectiveness and outcomes of High-flow nasal oxygen(HFNO) in a cohort of 43 confirmed COVID-19 patients with acute hypox- emic respiratory failure,they found after multivariate logistic regression analysis, male was independently associated with HFNO failure (adjusted OR, 6.948; 95% CI, 1.129–42.756; p = 0.037); a high Spo2 value at admission was a protective fac- tor associated with HFNO failure (adjusted OR, 0.562; 95% CI, 0.384–0.823; p = 0.003) [8].
In this study we would like to identify the risk factors leading to prolonged oxygen requirement in COVID-19 patients.This information will help us in managing our resources effectively in a resource-limited setting by preparing the mindset of the patients early on in the admission for home oxygenation.

Materials and Methods
Inclusion Criteria
1. Patients of age ≥ 18yrs with a positive RT-PCR COVID-19 report.
2. Patients with or without pre-existing lung conditions.

Exclusion Criteria

1. Patients who were already on home oxygen prior to infection with COVID-19.

Sample size

100 patients with a positive RT-PCR COVID-19 report.

Study Design

Retrospective study.

Study Period

1st October 2020 to 31st December 2020

Place of Study

DR B R Ambedkar Medical College & Hospital, Bangalore

Methodology

After taking informed consent from 200 patients, data will be collected with the help of a proforma. Detailed history including history of exposure to COVID-19 positive patient, symptoms during admission, physical examinations and baseline investigations like complete blood counts, renal function test, liver function test, serum electrolytes, RBS, arterial blood gas analysis, inflammatory biomarkers like ESR, CRP, procalcitonin and LDH, D-Dimer, chest X-Ray, HRCT Thorax (if indicat- ed), electrocardiography.

Statistical Tool for Analysis

Data will be summarized by mean, standard deviation (SD) and percentage. Statistical package for social sciences (SPSS) will be used for analysis. A p value of <0.05 indi- cates statistical significance. Sensitivity and specificity and other statistical tests, if relevant, will be applied. A multivariable logistic regression will be applied to study discrete outcomes in oxygen dependent patients requiring ≥ 1 week of oxygen therapy (eg: complete recovery, discharge on home oxygen or death.)

Conclusion

In a study conducted in Germany on 57 patients requiring supplemental oxygen not admitted to the ICU.All of the patients needed supplemental oxygen for 8 [5–13] days resulting in an overall hospitalization time of 12 [7–20] days.4. The median oxygen supply at admission was at 2 (0–4) L/min. 3 patients (5%) had already been on long-term oxygen therapy (LTOT). The median oxygen flow during the whole period of hospitalization was 2 (0.4–2.5) L/min. The majority of patients (77%) had bilateral infiltrates. Patients who died had higher values of inflammatory para- meters compared to survivors. In addition, D-dimers were elevated in all patients with higher values in those who died compared to survivors.9

In a study conducted on 833 Covid patients under 65 years of age who were admitted to the hospital in Sichuan Province, Renmin Hospital of Wuhan University, and Wuhan Red Cross Hospital, Oxygen therapy was highly required in the younger popu- lation as well. Early symptoms of respiratory failure, a higher respiratory rate, and lower albumin and globulin levels are independently associated with oxygen therapy.10

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