A Retrospective Mortality Study of Montelukast in Patients Hospitalized with COVID-19 Pneumonia

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Background

- COVID-19 treatments with systemic anti-inflammatory properties require further investigation
- Current treatments include supplemental oxygen, antiretrovirals and immunomodulators
- Antiretrovirals: To Prevent Viral Replications: Remdesivir
- Immunomodulators: Interleukin 6 (IL-6) inhibitor: Tocilizumab, Janus Kinase (JAK) inhibitor: Baricitinib, Steroid: Dexamethasone
- Montelukast inhibits leukotriene D4 in the lungs leading to anti-inflammatory, however needs further study in COVID-19 patients

Objective

- Does Montelukast decrease overall mortality in patients with COVID-19?
- Does Montelukast effect oxygen requirement, intubation, time on ventilator, hospital length of stay?

Methods

A retrospective cohort study between April 01, 2020 – April 01. 2022

Population demographics: *N* = 64,367 patients hospitalized with Covid-19 47.75% women, 52.24% men; age 58.9± 16.9 years

Drug Groups		
Group 0	N= 195	1. Montelukast
Group 1	N= 13,850	1. Dexamethasone
Group 2	N= 519	1. Montelukast 2. Dexamethasone
Group 3	N= 98	1. Montelukast 2. Remdesivir 3.Tocilizumab or Baricitinib
Group 4	N= 1,522	1.Montelukast 2. Dexamethasone 3. Remdesivir 4.Tocilizumab or Baricitinib
Group 5	N= 39,798	1. Dexamethasone 2. Remdesivir
Group 6	N= 1,837	1.Remdesivir 2. Tocilizumab or Baricitinib
Group 7	N= 6,558	No Medication

Statistical Analysis: $p < 0.05$ was considered to be statistically significant in all statistical analysis. Adjusted odds ratio with a 95% confidence include: Binary logistic regression model and multinomial logistic regression model

Binary logistic regression model: Likelihood of mortality (including hospice) & likelihood of intubation.

Multinomial Logistic Regression model: Likelihood of most invasive supplemental oxygen used when compared to no oxygen use.

Liner regression model: Amount of time on the ventilator and length of stay in the hospital (in days) a linear regression model was used for both.

Results

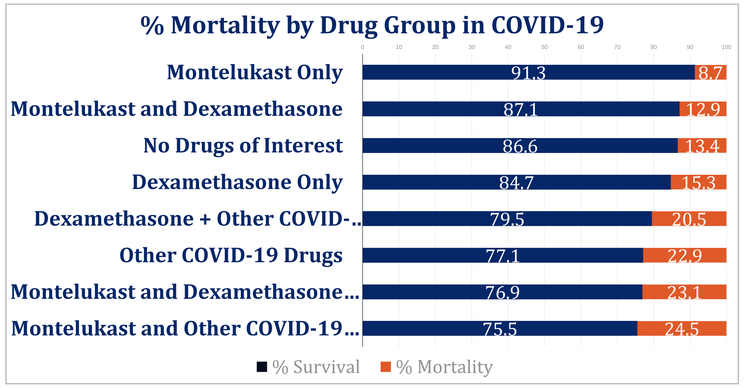

Figure 1. Shows percent mortality between all groups

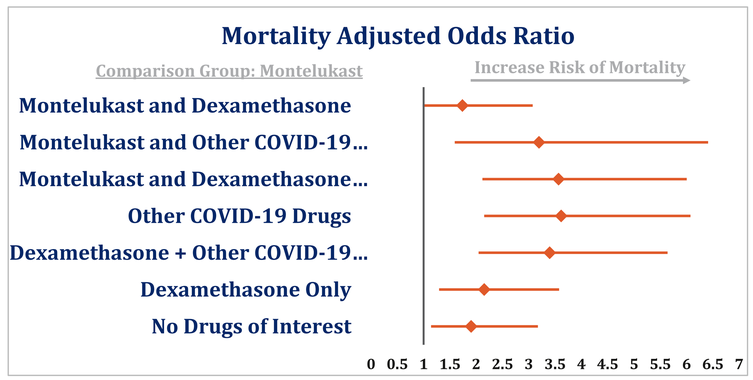

Figure 2. Mortality Adjusted Odds Ratio comparing Group 1 to all other Groups

Oxygen requirement by patients only on Montelukast	
Supplemental Oxygen type	Percentage of patients
Low flow oxygen < 15L	45.6%
High flow Oxygen > 15L	44.6%
BiPAP/ CPAP	5.6%
Ventilator/ ECMO	4.1%

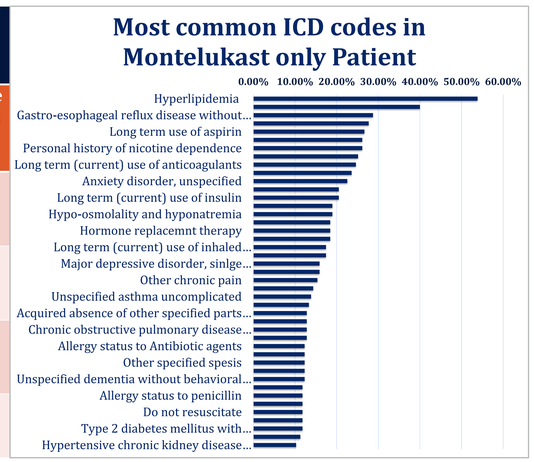

Figure 3. Shows percentage of most common ICD codes for Group 1

Discussion

- **Mortality, Most Invasive Supplemental Oxygen Type, Likelihood of Intubation**
  - Patients that did not receive montelukast had an increased likelihood of mortality over patients that only received montelukast.
  - Montelukast + Dexamethasone + COVID drugs was associated with; increased likelihood of mortality, increased likelihood of ventilator/ECMO (compared to low-flow oxygen), and increased likelihood of ventilator when compared to Montelukast alone.
- **Increased Time On Ventilator**
  - Drug groupings had no association with time on ventilator
- **Length of Stay**
  - A combination of Montelukast + Dexamethasone + COVID drugs was associated, with a longer length of hospital stay.
  - Considered to be a less objective indicator of clinical outcome since the approach to discharge planning varies between physicians and hospitals.
- **Limitations**
  - Additional comorbidities that may contribute to mortality, were not measured.
  - The introduction of the Covid-19 vaccine during the period of our study introduces may affect the determination of mortality outcomes.

Conclusion

- Consideration should be taken into limiting combined therapies for Covid-19 due to increased mortality. Treatment with either Montelukast or Dexamethasone or a combination of Montelukast with Dexamethasone may be considered as reasonable initial treatment for patients hospitalized with Covid-19.

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