# Changes in Hospital Admission Rates for COPD Patients due to Prehosptial Treatment Bundle Alterations During the COVID-19 Pandemic

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## Introduction

- Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of death and disability in the United States
- Few studies have investigated pharmacologic approaches to treat acute exacerbation of COPD (AECOPD) in the prehospital setting
- New protocols were put in place utilizing subcutaneous terbutaline in place of nebulized treatments during the COVID-19 pandemic to help safeguard prehospital providers from the high viral load created by the nebulization process
- Additionally, intravenous magnesium sulfate use was increased through additional protocol reinforcement education

## Objective

- Retrospectively evaluate the superiority of the standard practice for AECOPD events against the new alternative treatment plan necessitated by the COVID-19 pandemic

## Methods

- Approved as IRB exempt through the South East Area Health Education Center within Novant Health New Hanover Regional Medical Center
- Manual chart review of Novant Health New Hanover Emergency Medical Service and Novant Health New Hanover Regional Medica Center electronic medical records
- Outcomes from the Standard Treatment Group (STG) consisting of patients who received albuterol in a 13-month period prior to the April 1, 2020 protocol change were compared to the Alternative Treatment Group (ATG) consisting of patients who received terbutaline in a 2-year period following the protocol change
- Primary outcome was evaluated with overall hospital admission rates
- Secondary outcomes were specific unit admission rates, EMS to ED vital signs changes, length of stay, and 30-day mortality
- Admission rates, mortality, and magnesium sulfate usage rates were compared utilizing a Chi-squared of Fisher Exact test
- Vital sign changes and length of stay were evaluated utilizing Mann-Whitney *U* test

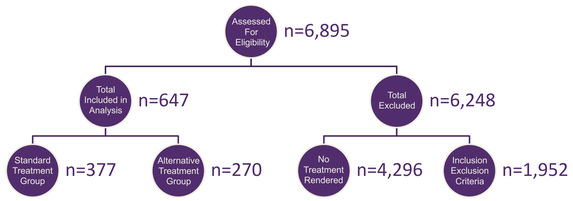


Figure 1. Sample Size Breakdown

Table 1. Demographics

| Demographics | Overall | Standard Treatment | Alternative Treatment |
|---|---|---|---|
| Sex (% female) | 54.87 (n=355) | 55.97 (n=211) | 53.33 (n=144) |
| Mean Age (years) | 66.60 (SD=11.11) | 67.36 (SD=11.26) | 65.51 (SD=10.82) |

Table 2. Admission Rates Per Treatment Group

| Admission Rate | Standard Treatment | Alternative Treatment | p Value[a] |
|---|---|---|---|
| Overall (%) | 62.60 (n=236) | 62.96 (n=170) | 0.437 |
| ICU (%) | 6.78 (n=16) | 8.24 (n=14) | 0.598 |
| PCU (%) | 13.14 (n=31) | 15.88 (n=27) | |
| Floor (%) | 80.08 (n=189) | 75.88 (n=129) | |

[a]Evaluated via Chi-squared Test

Table 3. Median (IQR) Length of Stay Per Treatment Group

| Admission Level | Standard Treatment | Alternative Treatment | p Value[a] |
|---|---|---|---|
| Overall (Days) | 4 (2-7) | 4 (2-7) | 0.899 |
| ICU (Days) | 7 (5-13) | 8.5 (5-15) | 0.602 |
| PCU (Days) | 7 (3.5-9.5) | 4 (2.5-6.5) | 0.057 |
| Floor (Days) | 3 (2-5) | 3 (2-6) | 0.617 |

[a]Evaluated via Mann-Whitney *U* Test

Table 4. Vital Signs Changes

| Vital Sign | Standard Mean Change | Alternative Mean Change | Difference between groups[a] | p Value[b] |
|---|---|---|---|---|
| HR (BPM) | -6.49 (SD=14.13) | -5.07 (SD=16.61) | -1.42 | 0.097 |
| SBP (mmHg) | -16.31 (SD=27.16) | -13.99 (SD=30.08) | -2.23 | 0.406 |
| SpO2 (%) | 7.29 (SD=11.98) | 8.87 (SD=14.57) | 1.58 | 0.139 |
| RR (per minute) | -3.44 (S=10.38) | -3.88 (SD=12.04) | 0.44 | 0.734 |

Abbreviations: HR, heart rate; SBP systolic blood pressure; RR, respiratory rate; SpO2, peripheral blood oxygen saturation

[a]Positive mean values of the alternative group minus the standard group

[b]Evaluated via Mann-Whitney *U* Test

## Results

- Overall admission rates only increased from the STG to the ATG by 0.36% and was not found to be significant ($p$=0.437)
- Admission rates to the ICU and PCU were higher in the ATG, but this was not found to be a significant change ($p$=0.598)
- Median length of stay remained the same between the groups at 4 days (IQR=2-7)
- Vital signs demonstrated improvement with EMS treatment in both groups
- STG had greater improvement to HR and BP while ATG had greater improvement to SpO2 and RR; however, none of the differences were found to be significant
- Mortality decreased slightly in the ATG by 1.44% but this change was not significant ($p$=1.000)

## Limitations

- Introduction of a safety nebulizer in 2021 limited ATG sample size
- Study was conducted on a single site
- Manual chart review poses risks for data collection errors

## Conclusion

- The use of the new treatment bundle does not show clinically significant differences suggesting that the null hypothesis (neither treatment plan is superior to the other) is supported
- Standard treatment for AECOPD should be followed if possible
- If faced with another significant health and safety crisis like the COVID-19 pandemic, this alternative treatment plan is appropriate to consider
- Further studies to find the optimal prehospital pharmacologic treatment for AECOPD is supported

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