Comparison of portable oxygen concentrators using a COPD patient simulation model

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Introduction

- Approximately 1.5 million Americans use home oxygen therapy.[1]
- Traditional in-home oxygen therapy requires heavy oxygen tanks for patients to transport, limiting mobility and quality of life. [1-2]
- With the advent of new portable oxygen concentrator (POC) technology, patients are able to travel with their oxygen therapy and have reported a higher quality of life. [1-2]
- However, studies have shown mixed efficacy in delivering adequate oxygen for various patient scenarios.[1-5]

Objectives

- Determine differences in delivered FiO2 among POCs at varying respiratory rates (15 breaths per minute (bpm), 20 bpm, 30 bpm, and 40 bpm).
- Examine differences in delivered FiO2 among POCs and control group oxygen delivery devices using a COPD patient lung simulator.

Methods

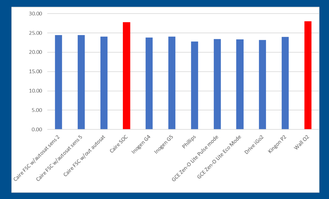
- This study utilized IngMar Medical Active Servo Lung 5000 to simulate a COPD patient's lungs.
- POC devices were compared to control devices, including wall oxygen and standalone oxygen concentrators at settings 2, 3, 5, and 6.
- Descriptive statistics and ANOVAs were computed to determine statistically significant differences between POCs and control devices.

Across most respiratory rate scenarios, the wall oxygen (control) obtained a higher FiO2 compared to the POCs.

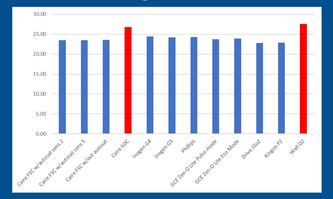
Excluding control groups: CAIRE FreeStyle Comfort achieved a higher FiO2 for the majority of the scenarios.

Inogen G4 obtained a higher FiO2 on setting 2 for 20 bpm.

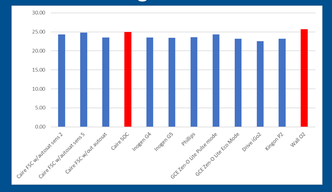
Setting 2: 15 BPM



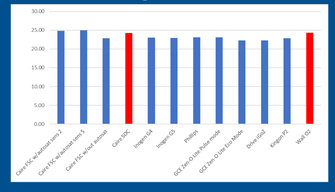
Setting 2: 20 BPM



Setting 2: 30 BPM

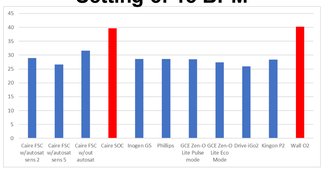


Setting 2: 40 BPM

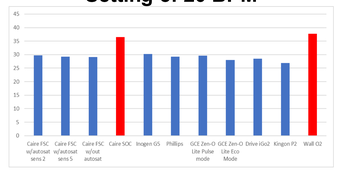


Results

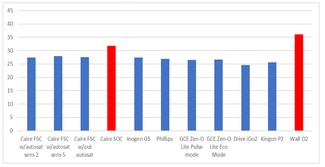
Setting 5: 15 BPM



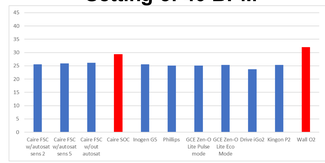
Setting 5: 20 BPM



Setting 5: 30 BPM



Setting 5: 40 BPM



Conclusions

- FiO2 measurements varied across POCs depending on the breathing rate scenario
- The CAIRE FreeStyle Comfort achieved a higher FiO2 compared to all other POCs in 7 out of the 8 scenarios.
- Clinical providers should account for their patients' respiratory rate demands when recommending specific POCs

Acknowledgement

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References

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