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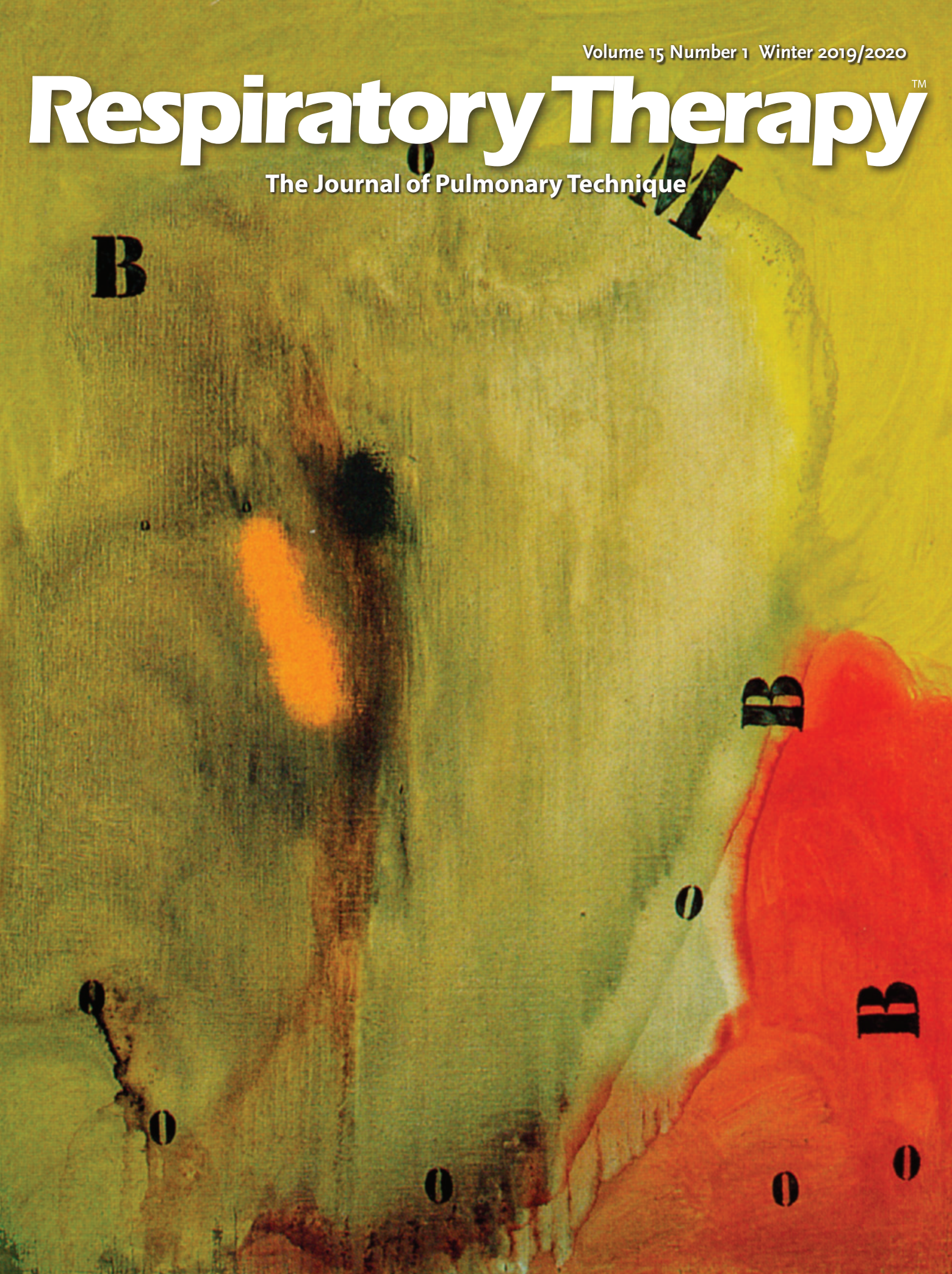

Two Portable Ventilators Have Their Oxygen Consumption Tested

Chris Campbell

When it comes to a patient's breathing, clinicians want to use the very finest equipment. Finding a cutting-edge ventilator that can deliver optimum results isn't so easy with so many different devices available.

That's why the research of the team of Justin Scott Phillips, Lance Pingul Pangilinan, Edward Karim Saliba, Mark Satomi Siobal and Edna Lee Warnecke involving two devices is so important — it shows one device outperforming another.

The equipment evaluation report is called Oxygen Consumption in Two Portable Ventilators Using a High Pressure Gas Source and the results were published online October 2019 through Respiratory Care. The authors of the report put two portable ventilators to the test.

"The VOCSN (Ventec Life Systems, Bothell, WA) and Trilogy (Philips Respironics, Murrysville, PA) ventilators can deliver oxygen via low or high pressure sources utilizing different circuits," the authors wrote. "We evaluated and compared oxygen consumption from a high pressure gas source using the two ventilators with a null hypothesis that there would be no difference."

Study Methods

The report authors said each device were put through a series of tests.

"A series of three tests were performed for all lung models and circuit configurations," the authors wrote. "Data for the three lung models were averaged for each test configuration and reported as the mean ± SD for both circuits."

The team felt a high pressure gas sources would be an effective way to test both devices.

"The VOCSN and Trilogy ventilators were evaluated using a high pressure gas source (e-cylinders regulated to 50 psi) with both passive (constant leak) and active (exhalation valve) circuits connected to a TTL test lung (Michigan Instruments, Grand Rapids, MI)," the authors wrote. "The three simulated TTL lung models were: normal - Cst 60 mL/cm H_2O and Raw 5 cm H_2O/L/s, restrictive - Cst 30 mL/cm H_2O and Raw 5 cm H_2O/L/s, and obstructive - Cst 60 mL/cm H_2O, Raw 20 cm H_2O/L/s. Using pressure ventilation modes, the peak pressure and rise time were titrated to achieve a tidal volume of 500 mL, as measured by a Certifier FA Plus (TSI Inc, Shoreview MN). Other settings include: frequency 12 breaths/min, PEEP 5 cm H_2O and IT 1.0 second, set FIO_2 of 0.40. Delivered FIO_2 was measured by the Handi + oxygen analyzer (Maxtec, Salt Lake City, UT) at the lung inlet. In addition, the VOCSN pulse dose function was evaluated by titrating its oxygen flow to achieve an FIO_2 of approximately 0.40. We measured the length of time to reduce e-cylinder pressure by 100 PSI for each lung model and test configuration, then calculated the liters of oxygen utilized per minute during each test run."

Research Findings

"Tidal volume delivery and measured FIO_2 remained relatively constant during all lung models, test configurations and circuit types (501 ± 7 mL and 0.397 ± 0.01 respectively)," the authors wrote. "Oxygen consumption using VOCSN with pulse dose oxygen delivery was 1.7 ± 0.7 and 1.7 ± 0.1 L/min, using VOCSN with set FIO_2 was 4.8 ± 0.8 and 2.4 ± 0.1 L/min, and using Trilogy with set FIO_2 was 5.2 ± 1.0 and 4.8 ± 0.9 L/min with passive and active circuits respectively."

Report Conclusions

Based on all of the testing, the authors concluded that the VOCSN satisfied the O2 demand using less oxygen, which allows the tank to last longer.

"Oxygen utilization was lowest using the VOCSN ventilator with pulse dose oxygen delivery with both the passive and active circuits, and with VOCSN using a set FIO_2 with the active circuit compared to the Trilogy 202 ventilator."

Footnotes

- Commercial Relationships: Mark Siobal: Aerogen and Aerogen Pharma
- Support: Disposable and non-disposable equipment (circuits, ventilators, a compressor and oxygen) were supplied by Ventec Life Systems

Chris Campbell is the Senior Editor of Respiratory Therapy.