

of eosinophilic asthma with the potential benefit of inhibiting eosinophilic airway inflammation for at least 30 days after one injection. A recent case report supports the use of benralizumab in this way (10). Larger studies are needed to determine whether this strategy is clinically effective and cost effective. ■

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Angela M. Moran, M.B. Ch.B.
Sanjay Ramakrishnan, M.B. B.S.
Catherine A. Borg, M.Sc.
Clare M. Connolly, M.Sc.
University of Oxford
Oxfordshire, United Kingdom

Simon Couillard, M.D.
University of Oxford
Oxfordshire, United Kingdom
and

Faculté de Médecine et des Sciences de la Santé de l'Université de
Sherbrooke
Sherbrooke, Quebec, Canada

Christine M. Mwasuku, B.Sc., Pg.Dip.
Ian D. Pavord, D.M.
Timothy S. C. Hinks, M.D., Ph.D.
University of Oxford
Oxfordshire, United Kingdom

Lauri Lehtimäki, M.D., Ph.D.*
University of Oxford
Oxfordshire, United Kingdom
and
Tampere University Hospital
Tampere, Finland

ORCID IDs: 0000-0002-2067-9335 (A.M.M.); 0000-0002-3003-7918 (S.R.);
0000-0002-4057-6886 (S.C.); 0000-0003-0699-2373 (T.S.C.H.);
0000-0003-1586-4998 (L.L.).

*Corresponding author (e-mail: lauri.lehtimaki@tuni.fi).

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In-Parallel Ventilator Sharing during an Acute Shortage: Too Much Risk for a Wider Uptake



To the Editor:

We read with interest the article by Beitler and colleagues on ventilator sharing among patients with coronavirus disease (COVID-19)-associated acute respiratory distress syndrome (1).

The COVID-19 pandemic has forced clinicians to develop strategies to avoid denying care because of ventilator capacity shortages induced by patient demand surges. Nevertheless, the safety of these strategies has been difficult to guarantee, as summarized in a recent multisociety consensus statement (2).

Beitler and colleagues implemented a careful protocol for a shared, in-parallel (i.e., simultaneous, breathing-together) ventilation circuit (1). Their methodology demonstrated the feasibility of ventilator sharing but at the cost of several major limitations we believe could prevent generalization or wider uptake, including the following:

- Patient compatibility criteria are crucial and require time and expertise. Unfortunately, COVID-19 “overrun,” as we will call it, is a situation in which time is “negative.” For many clinical staff, there is little time or ability to spend matching patients and monitoring it when patient course diverges. Many hospitals worldwide do not have the nursing levels of the United States.
- The patient-specific monitoring required is necessary but adds circuit complexity, cost, and technology that may not be available in many centers worldwide. It will also require significantly more technical expertise than is available outside major center hospitals.

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- Rescue ventilators (as a safety measure if shared ventilation fails) may not be available or may understandably also be in use in such a situation.
- Pressure control when patients breathe together does not ensure that lung damage from divergent patient courses does not occur. Driving pressure and barotrauma are an issue if compliance rises significantly for one patient and similarly for underventilation and a need for greater pressure in one patient. This approach thus puts great weight on not only patient matching but also matching and tracking patient course to avoid damage. It may work in a limited trial and study but not necessarily in a COVID-19 “overrun” situation, in which staffing capability is stretched to the limit.
- The authors state, “Patient selection and management require considerable expertise to ensure safety. Therefore, we recommend a regional referral model wherein ventilator sharing is restricted to expert centers, and patients and ventilators move throughout the region accordingly.” However, it requires significant time, cost, and effort to move infectious patients. It also implies greater risk for a select set of patients in the receiving center(s), which may not be ethical or provide equity of access to care for patients.

Importantly, we admire this result but feel in-parallel ventilation carries too much risk and difficulty to implement safely.

We would thus draw the authors’ attention to the concept of in-series breathing (patients breathe one after the other) in a simply implemented active circuit (3) as a safer alternative. It allows individualized positive end-expiratory pressure and driving pressure to account for differences between patients and reduces risk of harm because patients breathe separately (not together).

Thus, Beitler and colleagues (1) developed excellent results in a limited test situation but added significant complexity and cost per patient, which may not be feasible in general or in COVID-19 overrun. The use of in-parallel breathing requires significant matching of patient condition and monitoring of time course to assess risks of barotrauma or volutrauma (even with pressure control) as well as a risk of underventilation. All these risks are well-known to be difficult to monitor and assess in the best of times. A COVID-19 overrun situation demanding ventilator doubling is not the best of times. We suggest in-series breathing as a safer solution. ■

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J. Geoffrey Chase, Ph.D.
University of Canterbury
Christchurch, New Zealand

Yeong-Shiong Chiew, Ph.D.
Monash University
Bandar Sunway, Malaysia

Bernard Lambermont, M.D.
Philippe Morimont, M.D., Ph.D.
University of Liège Hospital
Liège, Belgium

Geoffrey M. Shaw, M.B. Ch.B., F.A.N.Z.C.A., F.C.I.C.M.
Christchurch Hospital
Christchurch, New Zealand

Thomas Desaive, Ph.D.*
University of Liège
Liège, Belgium

*Corresponding author (e-mail: tdesaive@uliege.be).

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Ventilator Sharing Using Volume-controlled Ventilation during the COVID-19 Pandemic



To the Editor:

In a recent article, Beitler and colleagues described their methodology and lessons learned from ventilator sharing during the acute shortage caused by the coronavirus disease (COVID-19) pandemic (1). We applaud their efforts during unprecedented circumstances, as we similarly assessed the safety and feasibility of ventilator sharing at a time of near depletion. In their assessment, each patient was matched with identical ventilator settings before sharing pressure-control ventilation. In our assessment, we used the Vent Multiplexor device to modulate flow in a volume-control mode and permit individual adjustments of V_T to two patients.

At baseline, patient A had a V_T of 350 ml (5.5 ml/kg predicted body weight), driving pressure of 14 cm H_2O with positive end-expiratory pressure (PEEP) of 14 cm H_2O , and pH 7.36 with Pa_{CO_2} , 56 mm Hg; patient B had a V_T of 450 ml (6.8 ml/kg predicted body weight), driving pressure of 12 cm H_2O with PEEP of 10 cm H_2O , and pH 7.42 with Pa_{CO_2} , 54 mm Hg. Each had different static lung compliances (A = 25 ml/cm H_2O ; B = 37.5 ml/cm H_2O). Both had a respiratory rate of 20 breaths/min and required vasopressor support and neuromuscular blockade for the assessment; neither had underlying lung disease. Before the assessment, consent was obtained from both patients’ families. The Vent Multiplexor was assembled within the circuit described in Figure 1. In the assessment, the device was adjusted to deliver different flow ratios to patients, with vitals, end-tidal carbon dioxide, plateau pressures, and arterial blood gases monitored over a 2-hour period.

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