

Automated versus manual oxygen titration in COPD exacerbation: machine or hands, this is the question

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Dear editor

We have read the article titled “Automated oxygen titration and weaning with FreeO₂ in patients with acute exacerbation of COPD: a pilot randomized trial” by Lellouche et al with great interest; however, there are some key aspects to take into account for proper practical implications.¹

First, regarding ethical aspects, there seem to be some confusing points about disclosure and researchers. Of the researchers, one is a co-inventor of company that developed the device and two are owners of free oxygen generator. We could not clarify whether any of the authors are medical doctors.

With regard to other aspects in the manuscript, the study included COPD patients (aged >40 years) with exacerbation and resting saturation <90% at room environment in whom SpO₂ increased to <92% by 8 L/min oxygen supplementation. It was mentioned that it was impossible to obtain informed consent from patients who stayed in the hospital for >24 h, those with antibiotic-resistant infection, those who underwent intermittent nonintensive ventilation, and those with cognitive dysfunction. Also, the authors did not mention comorbid conditions, body mass index, exercise capacity, duration of COPD, current therapies received, and, most importantly, whether there is comorbid heart failure in the patients.² The authors performed pulmonary function tests by post-bronchodilator spirometry; however, they did not take COPD grade (mild/moderate/severe) into account during standardization.³ In addition, there were no data regarding concurrent therapies given at emergency department and during admission. Did all patients undergo a standard treatment protocol? Moreover, patients of a broad range of age were included in the study. Thus, it is impossible to have no variations in exercise capacity, cognitive functions, and treatment response in this wide range of age from 40 to 80 years.

The finding that use of free oxygen device was only an effective factor in improved saturation and shortened length of hospital stay by neglecting many parameters arises some questions about the results obtained in this study. In the limitations, the authors mentioned that sample size per group was small. However, no power analysis was performed.

It was reported that the principal investigators were not involved in the care and disposition of study patients and that emergency room clinicians and nurses performed works related to the study; however, it was impossible that clinicians and nurses

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involved in the study were blind to study. Thus, the bias in the patient selection and management is controversial.

In conclusion, the study should have to be performed on selected patients by independent clinicians without funding.

Disclosure

The authors report no conflicts of interest in this communication.

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Authors' reply

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Dear editor

The letter from Karaoren et al referring to our recently published paper on the evaluation of FreeO₂ during acute exacerbation of COPD¹ raises questions regarding the possibility for researchers to evaluate their own innovations. Indeed, the FreeO₂ system that automatically adjusts the oxygen flow rate in spontaneously breathing patients to stabilize SpO₂ within a predetermined range was developed in our laboratory,² with the input of local researchers, pulmonologists, respiratory therapists, nurses, and biomedical engineers. This collaboration led to the development of a prototype that we naturally evaluated in our institution.

The authors of the letter imply that there are ethical issues in the evaluation of our own invention. We certainly do not share this position and would argue that we could not have done differently. We have already published the results obtained from other preliminary evaluations conducted in several clinical conditions and various clinical settings in >500 patients.¹⁻⁶ On every occasion, we did disclose our conflicts of interest. In addition, the results of other independent evaluations are yet to be published.

The patients who participated in our trial were managed by using a standardized clinical pathway that has been applied in our institution for years, except for oxygen administration. The body mass index and cardiac comorbidities did not differ between the groups. Exercise capacity before hospitalization was unknown for most of the patients. We would not consider this information as critical to the proper interpretation of our findings. The issue of blinding is certainly relevant. However, as in most respiratory support studies, it was not possible to incorporate blinding in the study design. A power analysis was not conducted in this

pilot study. Based on the current results, power analysis will be feasible for further studies.

Oxygen manual titration with flowmeters is used in hospitals for more than one century, and certainly, there is room for improvement.⁷ As shown in several studies, compared to manual/hand titration, automated oxygen titration with the FreeO₂ system or similar devices might reduce the hypoxemia and hyperoxia rates and has the potential to reduce oxygen therapy duration as well as hospital length-of-stay.^{1,4,8} We thus see innovation with this new device.

Disclosure

The Fond de Recherche en Santé du Québec contributes to FL's salary for research activities (clinical research scholar) and to the research assistant's salary (clinical research grant). FL and ELH are the coinventors of the FreeO₂ system and made the first prototypes with the engineering department of Laval University. FL and ELH are the cofounders of a Laval University spin-off research and development company (OxyNov) to develop automated systems for respiratory support. FM holds a GlaxoSmithKline/Canadian Institutes of Health Research chair on COPD at Laval University. FM and YL participate in Innovair, a company that owns shares in OxyNov, the owner of the FreeO₂ device. The authors report no other conflicts of interest in this communication.

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