Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Respiratory Medicine 197 (2022) 106854

Contents lists available at ScienceDirect

Respiratory Medicine

journal homepage: www.elsevier.com/locate/rmed

Correspondence

Nebulization and COVID-19: Is the risk of spread actual?

Support

No financial support

Funding source

none.

The airborne transmission of SARS-CoV-2 has been quickly suggested based on the stability of SARS-CoV-2 in aerosol for 3 hours [1]. Nebulization, by a possible microorganisms contamination [2] and/or by the aerosolization of contaminated particles [3], may theoretically expose mucosae and eyes of the health care workers to the virus and contaminate the surfaces with potentially infective droplets. Thus, various guidelines on nebulization emerged during the SARS-CoV-2 pandemic, in order to ensure a maximal protection (face masks for the patient, expiratory filter on the nebulizer, ventilation of the room, individual protection equipment for healthcare workers) [4]. To note, in the previous 2 years, clinicians do not report in daily practice viral clusters induced by nebulized treatments. This study aimed to address the risk of airborne transmission in patients hospitalized with severe COVID-19.

Ten severe COVID-19 patients (tachypnea, hypoxemia, more than 50% lung involved on imaging and treated with nebulization) were recruited at the admission in the hospital. They were treated by nebulization of isotonic saline solution (n = 6), ipratropium bromide (n = 2), or ipratropium and fenoterol (n = 2) with a standard single-use jet nebulizer operating at 8 L/min with a T piece connected to a mouthpiece (Opti-Mist Plus®, ConvaTec, Bridgewater, NJ) and a filter. Immediately after the first nebulization, the residual solution of each nebulizer was sampled. Then, the nebulizers were refilled with 3 mL isotonic saline solution (0·9%) to complete the residual volume (1mL). The filter was replaced by a BioSampler® (SKC 20-mL) loaded with 20 mL phosphate-buffered saline (PBS) and 0·5% bovine serum albumin [5]. The nebulizer was driven by a compressed air supply (Fig. 1), and a 10min-nebulization was performed again on the bench. The emitted aerosol was continuously collected during the nebulization. The nominal and emitted dose were sampled. The SARS-CoV-2 viral load was quantified in all samples by RT-PCR (negative threshold <10 copies/mL). The experimental set up was previously validated with a positive control of SARS-CoV-2 directly loaded into the nebulizer's reservoir.

The median viral load of the patients was $5{\cdot}6x10^5$ copies/mL (range $1{\cdot}5x10^3$ to $189x10^6$). No SARS-CoV-2 RNA was found in any sample for all nebulizations.

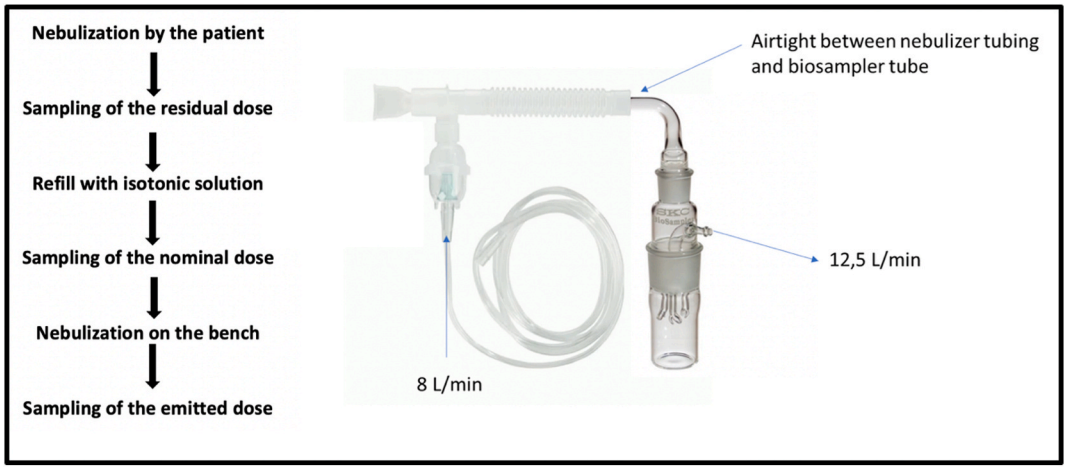

Fig. 1. Experimental set-up with the BioSampler SKC 20mL.

https://doi.org/10.1016/j.rmed.2022.106854
Received 9 April 2022; Accepted 16 April 2022
Available online 20 April 2022

The result of this study shows no SARS-CoV-2 nebulizers contamination by COVID-19 patients at hospital and does not support the role of nebulizers in terms of aerosol virus dissemination in air. Nevertheless, exhaled virus by the patient itself remains and must be considered independently to the nebulizer.

Declaration of competing interest

none for all authors.

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