Decision Summary: Vibrating-Mesh Nebulizers

The B.C. AGMP Expert Committee reviewed whether **Vibrating-mesh nebulizers** are aerosol generating. The AGMP Expert Committee conducted a literature review to identify relevant primary evidence, review articles, and guidelines/recommendations from governing bodies, medical societies and other expert groups. The search results were assessed for evidence quality and source using the provincial AGMP decision framework. The expert group does not provide personal protective equipment (PPE) guidance.

The AGMP Expert Committee determined that **Vibrating-mesh nebulizers** are a non-AGMP.

Summary

Vibrating-mesh nebulizers use vibrating mesh technology to nebulize medications in the hospital setting. A mesh nebulizer separates the drug from the patient interface (1), powered by electricity and has a small residual volume. The mouthpiece and mask are separated by a valved-holding chamber that is not in communication with the reservoir cup that contains the medication and aperture plate that produces the aerosol. Importantly, the use of a device like this during the delivery of oxygen through high-flow nasal cannula (HFNC), non-invasive ventilation (NIV), and mechanical ventilation maintains a closed circuit reducing the risk of aerosol generation into the environment (2,3). By breaking the circuit, it may provide a path for exhaled breath or patient-derived secretions which may be infectious (4).

Dailey and Fink (5) evaluated nebulizers, including vibrating mesh nebulization, using nebulized *Pseudomonas aeruginosa* colony counts, demonstrated no growth at several time points during use. Additionally, vibrating mesh nebulization had reduced fugitive emissions thought to be due to the combination of lower airflow and valve system (6).

Based on the available evidence reviewed above, the AGMP Expert committee determined that **Vibrating-mesh nebulizers** are a non-AGMP.

References

1. Ari A. Practical strategies for a safe and effective delivery of aerosolized medications to patients with COVID-19. Respir Med. 2020 Jun;167:105987.

2. Dugernier J, Hesse M, Jumetz T, Bialais E, Roeseler J, Depoortere V, et al. Aerosol Delivery with Two Nebulizers Through High-Flow Nasal Cannula: A Randomized Cross-Over Single-Photon Emission Computed Tomography-Computed Tomography Study. J Aerosol Med Pulm Drug Deliv. 2017 Oct;30(5):349–58.

3. Réminiac F, Vecellio L, Loughlin RM, Le Pennec D, Cabrera M, Vourc'h NH, et al. Nasal high flow nebulization in infants and toddlers: An in vitro and in vivo scintigraphic study. Pediatr Pulmonol. 2017 Mar;52(3):337–44.

4. Joyce M, McGrath JA, Mac Giolla Eain M, O'Sullivan A, Byrne M, MacLoughlin R. Nebuliser Type Influences Both Patient-Derived Bioaerosol Emissions and Ventilation Parameters during Mechanical Ventilation. Pharmaceutics. 2021 Feb 2;13(2):199.

5. Dailey PA, Fink JB. Contamination of Aerosol with Pseudomonas Aeruginosa Introduced via Mouthpiece in Different Nebulizer Designs [Internet]. Vol. 10, Medical Research Archives. 2022. Available from: https://esmed.org/MRA/mra/article/view/2863

6. McGrath JA, O'Sullivan A, Bennett G, O'Toole C, Joyce M, Byrne MA, et al. Investigation of the Quantity of Exhaled Aerosols Released into the Environment during Nebulisation. Pharmaceutics. 2019 Feb 12;11(2):75.