Title	Disinfection and Reuse of Metered-Dose Inhalers	Code: Inh/AQ – 007.01
Department responsible	Multidisciplinary Services Department (DSM) – Respiratory Therapy	
Approved by manager	Guy Gendron	
Effective date	December 22, 2023	
Next review	5 years	

1. Background

Procedure to ensure the safe reuse of metered-dose inhalers in order to avoid overconsumption and waste.

2. Objectives/Indications

To regulate the reuse of metered-dose inhalers in order to reduce their environmental footprint while complying with aseptic standards.

3. Principle

Since the disposal of metered-dose inhalers containing doses of medication and propellant gas is associated with significant greenhouse gas (GHG) emissions, safe reuse in accordance with the standards set by the infection prevention department at CHU Sainte-Justine helps reduce the environmental impact.

4. Sectors of activity

☐ SIP ☐NÉO ☐ÉTA ☒URG ☐UFBO ☐CRME ☐ÉCOLE ☒FCTP ☐PSG

5. Target clientele

All patients who use metered-dose inhalers in the emergency department and pulmonary physiology laboratory.

6. Contraindications

N/A

7. Associated risks and complications

N/A

8. Required Materials/Equipment

Hospital-grade disinfectant wipe (e.g., Accel)

9. Required medication

N/A

10. Administration/procedure by sector

The Ordre professionnel des inhalothérapeutes du Québec (OPIQ) confirms that metered-dose inhalers may be reused in accordance with the infection prevention and control (IPC) standards of the facility in question.

The *Infection Prevention and Control* Department *at CHU Sainte-Justine* authorizes the reuse of metered-dose inhalers provided that the following recommendations are followed:

- Use the metered-dose inhaler via a spacer containing a one-way valve.
- The metered-dose inhaler must be disinfected with a hospital-grade disinfectant wipe before and after use with the patient.
- The metered-dose inhaler must be stored in a container located in a designated area. Provide a system with two containers: one for soiled inhalers and another for clean inhalers.
- Containers and aerosol dispensers must be cleaned at least once a day, in addition to being disinfected before and after each use.

11. Specific features by sector

It is important to verify that there is still medication with the propellant in the device intended for reuse. To verify this, in the emergency room and pulmonary physiology laboratory, weigh the metered-dose inhaler reservoirs daily. A minimum weight threshold has been determined for the two types of metered-dose inhalers administered in these two areas.

The weight of the reservoirs must be measured at least once a day using medical-grade scales.

- Depending on the weight of the device, it is either recycled or reused:
    - Salbutamol/Ventolin number of doses[1] : *(see Appendix 1)*

      Full weight: ± 28.75g

Weight after 200 doses: ± 11.43g

- Ipratropium bromide/Atrovent[2] : *(see Appendix 2)*
  Full weight: ± 23.46g
  Weight after 200 doses: ± 10.86g
- Cylinders **weighing > 13g** are kept for reuse
- Tanks **weighing ≤ 13g** are disposed of in a safe and environmentally responsible manner. *(See Policy and Procedure on the Safe Disposal and Recycling of Inhaler Devices – Inh/AQ – 006.01)*

12. Medical prescription

N/A

13. Warning

As stipulated by the Ordre professionnel des Inhalothérapeutes du Québec (OPIQ), the reuse and cleaning of metered-dose inhalers are subject to the standards established by the local infection prevention committee.

14. Specific ongoing monitoring

N/A

15. Note to file

N/A

16. Procedure in case of equipment failure

N/A

17. Cleaning and storage

- Clean the reservoir, plastic handle, mouthpiece, and cap using hospital-grade disinfectant wipes (e.g., Accel).
- Soiled and clean containers, as well as the metered-dose inhalers they contain, must be disinfected using a hospital-grade wipe once a day. For metered-dose inhalers, this disinfection is in addition to that performed before and after use on the patient. Disinfection is carried out at the time of daily weighing.
- Spacer chambers are sent to the medical device reprocessing unit between each patient. They are reprocessed in a washer-disinfector using the pasteurization cycle for a maximum of five times.

18. Responsibility

The respiratory therapist has the following responsibilities in accordance with the standards of practice required by the Ordre professionnel des inhalothérapeutes du Québec (Quebec Professional Order of Respiratory Therapists):

Standard 7: Apply preventive measures for asepsis, health, and safety

7.5 Apply standards, methods, or techniques related to the protection of healthcare workers and patients

- Apply aseptic techniques to patients and medical devices in accordance with current infection prevention standards

19. Conclusion

By complying with the aseptic standards established by the Infection Control and Prevention Department at CHU Sainte-Justine, the reuse of metered-dose inhalers helps prevent overconsumption and waste while reducing the ecological footprint.

20. Checklist

N/A

21. References

- [1] Sellers WFS. Asthma pressurized metered dose inhaler performance: propellant effect studies in delivery systems. Allergy Asthma Clin Immunol. 2017 Jun 29;13:30. doi: 10.1186/s13223-017-0202-0. PMID: 28670327; PMCID: PMC5492461.
- [2] Penick Brock, Tina, *Accuracy of Float Testing for Metered-Dose Inhaler Canister*, Journal of the American Pharmaceutical Association, July/August 2002, Vol 42, No.4

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- PubMed Central. August 2013. Shared Metered Dose Inhalers Among Multiple Patients. 434,442. Accessed June 2023 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3814444/
- Professional Order of Respiratory Therapists, 2021. "*Practice standards, a guarantee of competence*," accessed January 2023. https://www.opiq.qc.ca/wp-content/uploads/2021/04/OPIQ_StandardsCompetences.pdf_V2.pdf

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22. Appendices

Appendix 1 - Average weight and volume of salbutamol inhalers[1]

Weights and volumes of salbutamol HFA134a propellant pMDIs

	Small salbutamol Salamol[R]	Large salbutamol Ventolin[TM]
Actuations of a first full pMDI		
Cartridge weight		
Full	15.64 g	28.75 g
Empty	7.76 g	11.43 g
Total volume	1640 ml	3885 ml[a]
Actuations of a second full pMDI		
151–200 (50)	350 ml	800 ml
201–210 (10)	70 ml	160 ml
211–220	70 ml (last "sensing")	160 ml (last "sensing")
221–230	65 ml	100 ml
231–240	30 ml	70 ml
241–250	5 ml	40 ml
251–260	0 ml	15 ml
Total volume	1640 ml	3745 ml[a]

[a]140 ml less total propellant gas volume of second large pMDI

Appendix 2 – Average weights of ipratropium bromide (Atrovent), salbutamol (Ventolin), and fluticasone (Flovent) inhalers[2]

Table 1. Points of Measurement and Mean Canister Weights

	Atrovent[a]		Flovent[b]		Ventolin[a]	
% Medication Remaining	No. of Doses Remaining	Weight[c] Mean ± SD	No. of Doses Remaining	Weight[c] Mean ± SD	No. of Doses Remaining	Weight[c] Mean ± SD
100	200	23.46[d]	120	19.92 ± 0.05	200	28.17 ± 0.11
90	180	22.38 ± 0.08	108	18.91 ± 0.07	180	26.48 ± 0.11
75	150	20.36 ± 0.06	90	17.44 ± 0.04	150	23.91 ± 0.14
66	132	19.35 ± 0.11	79	16.7 ± 0.08	132	22.58 ± 0.17
50	100	17.19 ± 0.18	60	15.21 ± 0.11	100	19.66 ± 0.23
33	66	15.22 ± 0.26	40	13.82 ± 0.23	66	17.18 ± 0.32
25	50	14.06 ± 0.32	30	13.02 ± 0.31	50	15.83 ± 0.32
10	20	12.13 ± 0.37	12	11.67 ± 0.36	20	13.46 ± 0.33
0	0	10.86 ± 0.42	0	10.81 ± 0.42	0	11.81 ± 0.35

SD = standard deviation.
[a] 200 metered actuations.
[b] 120 metered actuations.
[c] Mean weight in grams.
[d] Only one canister weight available.

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